1.0 INTRODUCTION

This Environmental Assessment (EA) has been prepared in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321-4370d); the Council on Environmental Quality (CEQ) regulations implementing the procedural provisions of NEPA (40 CFR 1500-1508); and 10 CFR 1021 (CFRa), Department of Energy's (DOE) regulations for implementing NEPA. These regulations require the preparation of an EA that evaluates the potential environmental impacts from DOE proposed actions that are not categorically excluded from these requirements. The purpose of this EA is to provide DOE with sufficient information to determine whether a Finding of No Significant Impact (FONSI) is supported for the proposed actions or whether an Environmental Impact Statement (EIS) may be required.

The proposed actions in this EA include modifications to ponds in the North and South Walnut Creek drainages, as well as configuration changes at the Rocky Flats Environmental Technology Site (RFETS or Site) supporting closure. As some of the proposed actions described in this EA may be located in floodplains, this EA incorporates analyses necessary to assess impacts to wetlands and floodplains, as required by 10 CFR 1022 (CFRb). For proposed actions that have the potential to impact floodplains and/or wetlands environments, the regulation requires a description of the proposed activities, an analysis of potential impacts to floodplains and wetlands, and an analysis of alternative actions to the proposed action. 10 CFR 1022 incorporates agency-specific regulations as required by Executive Order 11988, *Floodplain Management*, and Executive Order 11990, *Protection of Wet Lands*. Additionally, Executive Order 11990 requires actions taken within wetlands to minimize the destruction, loss or degredation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. The proposed actions presented in this EA are analyzed with protection of wetlands as a significant consideration. Finally, Executive Order 11988 requires actions taken within floodplains to consider alternatives to avoid adverse effects and incompatible development in floodplains. The proposed actions presented in this EA are analyzed with floodplain protection as a consideration.

1.1 Background

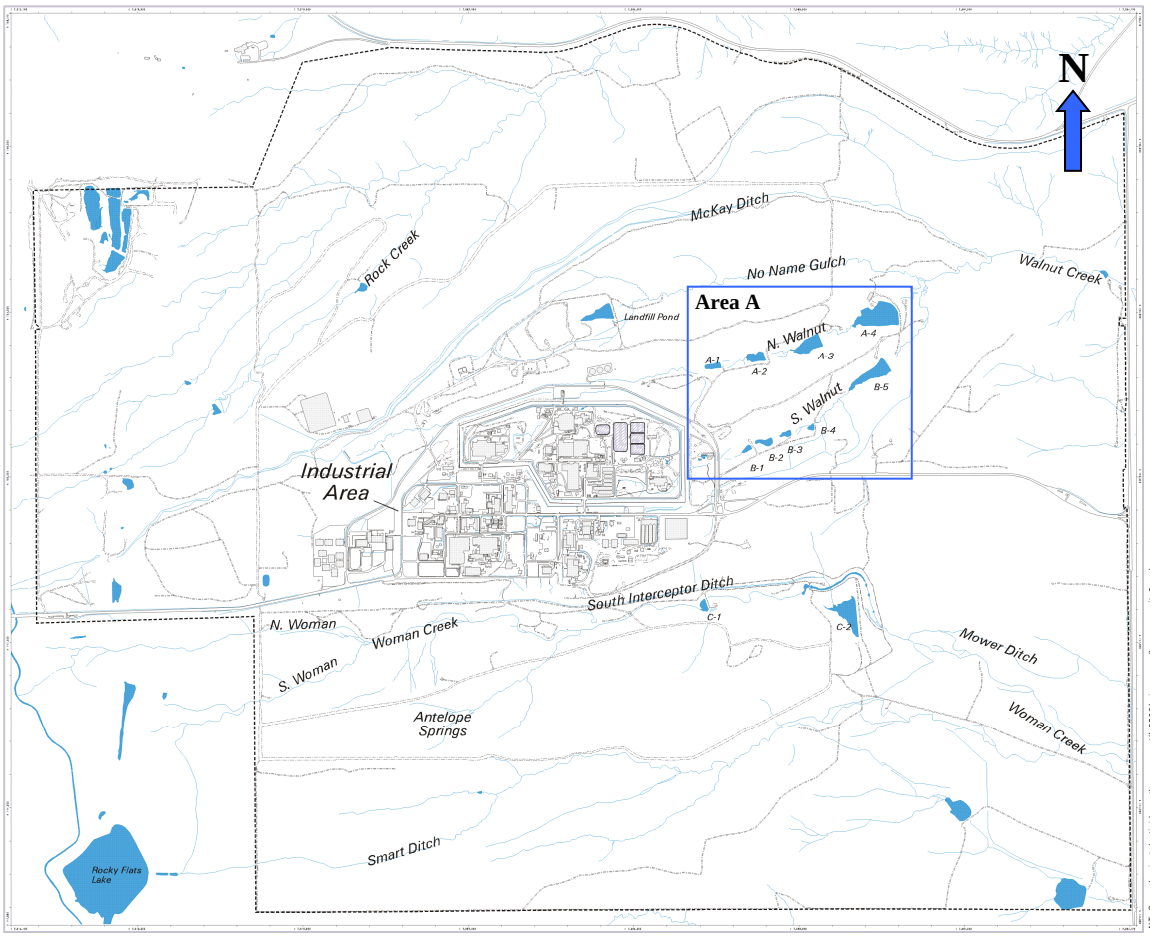
1.1.1 Site Description

RFETS is a DOE facility located in northern Jefferson County, Colorado, approximately 16 miles northwest of Denver. Formerly used to process and manufacture nuclear weapons components, the Site is now undergoing closure, environmental remediation, and ultimate transfer of most of the Site to the U.S. Fish and Wildlife Service (USFWS) for use as a National Wildlife Refuge. The Site is approximately 6,550 acres in size. The developed Industrial Area (IA) is centrally located within the RFETS boundary and occupies approximately 400 acres. The RFETS Buffer Zone surrounds the IA and occupies the remaining 6,150 acres (see Figure 1-1).

Most activities currently performed at the Site are under the Rocky Flats Cleanup Agreement (RFCA) or separate environmental permits. RFCA is both a cleanup

agreement under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and a Compliance Order on Consent under the Resource Conservation and Recovery Act (RCRA) and the Colorado Hazardous Waste Act. The ponds referenced below are identified as Individual Hazardous Substance Sites in Attachment 3 of RFCA. All appropriate analysis and any necessary response actions will be taken pursuant to RFCA prior to conduct of the activities in this EA. However, the activities proposed in this EA do not fall within the scope of RFCA/CERCLA, and therefore require separate environmental analysis.

Figure 1-1. RFETS Site Map



Transferring the Site to the USFWS for use as a National Wildlife Refuge requires some modifications to the Site configuration, changing it from an industrial setting to a stable and more functional setting. Actions proposed in this EA include reconfiguration of Site ponds, general modifications to the IA, and removal of select roads and stormwater routing systems.

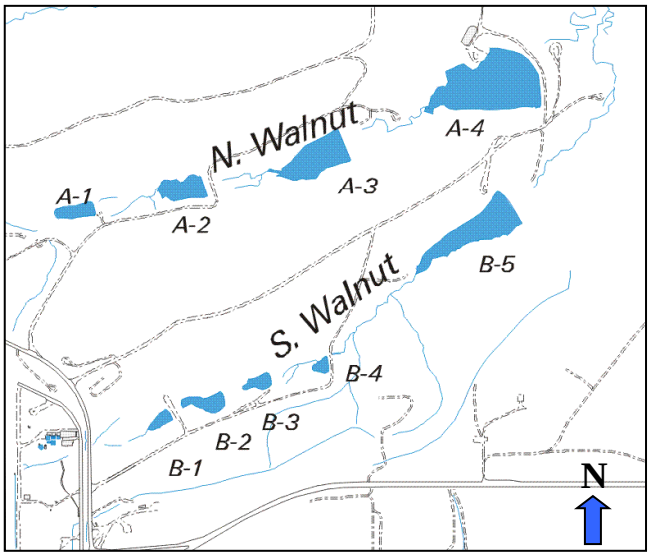
The habitat for the Preble's meadow jumping mouse (Preble's mouse, *Zapus hudsonius preblei*), a federally listed threatened species, may be affected by the proposed actions. RFETS is currently working with the USFWS to address impacts to the Preble's mouse

and its habitat. The potential impacts are summarized in this EA; detailed information on the impacts to the Preble's mouse and its habitat are specified in the consultation documents with the USFWS.

1.1.2 North and South Walnut Creek Retention Ponds

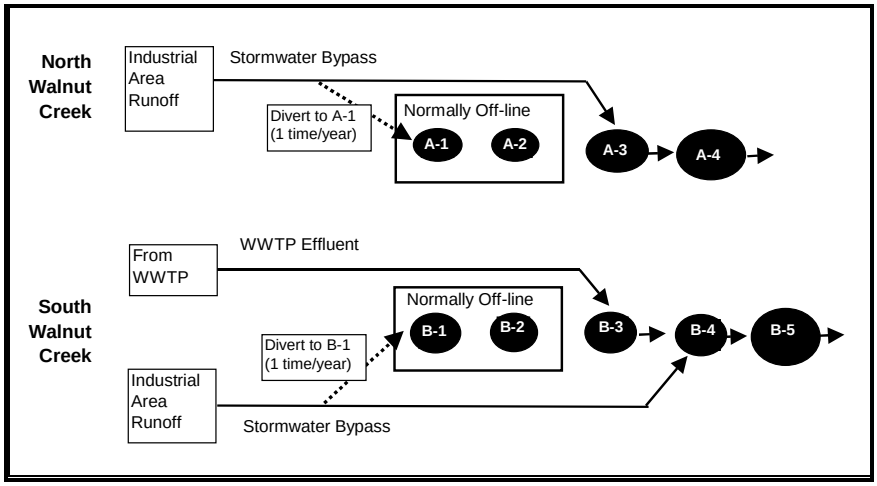
The Site presently maintains twelve retention ponds in multiple drainages. Only the nine ponds located in North and South Walnut Creeks are addressed here, since they are the ponds impacted by actions discussed in this EA (see Figure 1-2, an enlargement of Figure 1-1, Area A). North Walnut Creek has four ponds (A Series ponds) and South Walnut Creek has five ponds (B Series ponds). The ponds were historically constructed, and are still currently used, to provide a safeguard for the quality of surface water leaving the site. While the ponds have been effective at promoting water quality through detention and settling of suspended solids, they are not anticipated to be part of the final RFCA remedy for the Site.

Figure 1-2. RFETS A and B Series Ponds



The current flow routing through North Walnut Creek (A Series) and South Walnut Creek (B Series) drainages is presented in Figure 1-3. A general description of the water management in these drainages is provided below and is summarized in Table 1-1.

Figure 1-3. Current Flow Routing – North and South Walnut Creek Ponds



North Walnut Creek

In North Walnut Creek, stormwater is normally routed around Ponds A-1 and A-2 to maintain capacity in these ponds, so that runoff can be captured in the event an accidental spill were to occur upstream (e.g., chemical release in the IA). Historically, water is diverted into Pond A-1 approximately once per year to keep the sediments wet. Although Pond A-2 is also typically operated off-line, it historically does not require imported water to keep the sediments wet throughout the year, because of local runoff and groundwater discharge to the surface. If Ponds A-1 and A-2 require being discharged, it is accomplished through the use of pumps, as the outlet works for these ponds are not operable.

Stormwater in North Walnut Creek is normally routed into Pond A-3 for detainment and settling of solids. Pond A-3 is discharged in batches to the A Series terminal pond, Pond A-4, where the water is again detained for settling of solids. After filling to a designated level (typically approximately 50 percent of capacity), the process is initiated to discharge the pond. Pond A-4 water is isolated, sampled, and, if downstream surface water quality criteria are met, released to North Walnut Creek (via the outlet works). Discharge batches typically involve approximately 41.4 acre-feet (13.5 million gallons), and typically occur 2 to 4 times per year. Water discharged from Pond A-4 is sampled at RFCA surface water monitoring location GS11, which is located just downstream from the Pond A-4 outlet works.

South Walnut Creek

Stormwater in South Walnut Creek is normally routed around Ponds B-1 and B-2 (similar to Ponds A-1 and A-2 in North Walnut Creek), so the capacity in these ponds is available to capture runoff in the event of a spill upstream. Water is historically diverted into Pond B-1 approximately once per year to keep the sediments wet, while Pond B-2 has historically not required imported water to remain partially full throughout the year because of local runoff and groundwater discharge to the surface. If Ponds B-1 and B-2

require discharging, it is accomplished through the use of pumps, as the outlet works for these ponds are not operable.

Pond B-3 receives effluent from the Site's wastewater treatment plant (WWTP) and flows into Pond B-4. Pond B-4 also receives flow from South Walnut Creek, which is diverted around Ponds B-1, B-2, and B-3. Pond B-4 flows continuously into the B Series terminal pond, Pond B-5. After filling to a designated level (typically approximately 35 percent of capacity), the process is initiated to discharge the pond. Pond B-5 water is sampled, and, if downstream surface-water quality criteria are met, released to South Walnut Creek (via the outlet works). Unlike Pond A-4, Pond B-5 cannot be isolated from inflows, and therefore continues to receive inflow during the sample analysis period (approximately two weeks). Discharge batches typically involve approximately 41.1 acre-feet (13.4 million gallons) and typically occur 6 to 8 times per year. Water discharged from Pond B-5 is sampled at RFCA surface water monitoring location GS08, which is located just downstream from the Pond B-5 outlet works.

Other Drainage Features

In addition to the retention ponds and flow bypass structures described for North and South Walnut Creeks, other man-made features exist that demonstrate the complexity of the current system configuration. Specifically, between Ponds B-2 and A-2, a buried pipeline exists to allow pumping of water between drainages. Similarly, aboveground pipelines exist between Ponds B-3 and A-3, and between Ponds B-5 and A-4.

Table 1-1. Summary Information – A and B Series Ponds

Drainage	Pond	Capacity (Mgal)	Current Purpose/Use
North Walnut Creek	A-1	1.4	Normally held off-line (stormwater routed around pond) to maintain capacity for emergency spill control.
	A-2	6.0	Normally held off-line (stormwater routed around pond) to maintain capacity for emergency spill control.
	A-3	12.4	Receives stormwater runoff from North Walnut Creek, including northern portion of Industrial Area. Discharged in batches to Pond A-4.
	A-4	32.1	Receives stormwater from Pond A-3. Discharges are released in batches to flow offsite.
South Walnut Creek	B-1	0.5	Normally held off-line (stormwater routed around pond) to maintain capacity for emergency spill control.
	B-2	1.6	Normally held off-line (stormwater routed around pond) to maintain capacity for emergency spill control.

Drainage	Pond	Capacity (Mgal)	Current Purpose/Use
South Walnut Ck.	B-3	0.6	Receives treated effluent from WWTP. Continual flow through discharge to Pond B-4.
	B-4	0.2	Receives stormwater runoff from South Walnut Creek, including central portion of Industrial Area, as well as flows from Pond B-3. Continually flows into Pond B-5.
	B-5	24.0	Receives flow from Pond B-4 (combination of stormwater and treated WWTP effluent). Discharges are released in batches to flow offsite.

1.1.3 Wetlands

According to the 1996 EA and FONSI addressing the RFETS surface water drainage system (DOE, 1996) and the *Rocky Flats Plant Wetlands Mapping and Resource Study* (USACE, 1994), a wide variety of wetlands occur along the valley slopes, floodplains, and stream channels of the Site. Across the entire Site, approximately 1,100 wetlands and deep water habitats were classified and described during the 1994 U.S. Army Corps of Engineers (USACE) study. The USACE study identified three wetland systems that occur at the Site (riverine, lacustrine, and palustrine), with the palustrine system as the primary type; that is, vegetated or consisting of only small, open water bodies less than 20 acres in size and 6.5 feet in depth (USACE, 1994).

These wetlands occupy approximately 191 of the Site's 6,550 total acres, and provide value for erosion control, floodwater storage and attenuation, water quality maintenance, natural heritage, and fish and wildlife habitat (USACE, 1994). Table 1-2 provides some perspective on the size of the wetland areas in the Walnut Creek watershed, relative to the other watersheds at the Site. It is important to recognize that some of the wetlands in Walnut Creek listed in Table 1-2 are downstream from the area that will be impacted from the action discussed in this EA.

Table 1-2. Watershed Wetland Summary

Watershed	Stream Wetlands		Slope Wetlands		Total Wetlands	
	No. of wetlands	Acreage	No. of wetlands	Acreage	No. of wetlands	Acreage
Rock Creek	163	25.4	152	32.2	315	57.6
Woman Creek	135	30.0	85	25.8	220	55.7
Smart Ditch	204	28.2	17	1.4	221	29.6
Walnut Creek	300	40.1	43	8.1	343	48.1
Totals	802	123.6	297	67.4	1099	191.0

Source: USACE, 1994.

1.2 Purpose and Need for Action

DOE is responsible for managing the water discharges at RFETS in an environmentally acceptable manner and in compliance with local, state, and federal regulations. This responsibility will continue after termination of Site activities and final closure of the Site (K-H, 2002c). To accomplish this long-term responsibility, the drainage system should require less active management and maintenance than the current system and should preserve existing wetlands and habitat as available water allows.

The proposed action in this EA would modify six dams located in North and South Walnut Creek to create a flow-through system. The ponds to be modified in the proposed action include Ponds A-1 and A-2 on North Walnut Creek and Ponds B-1, B-2, B-3 and B-4 on South Walnut Creek (see Figure 1-2). Stormwater could ultimately be routed through all of the ponds, instead of diverted around several ponds, as currently occurs. The modified dams would be operated passively, without the need for active operation of outlets and valves. Modifications to the dams would involve constructing "notches" to reduce their effective capacity and thereby allow water to flow through at lower pool levels.

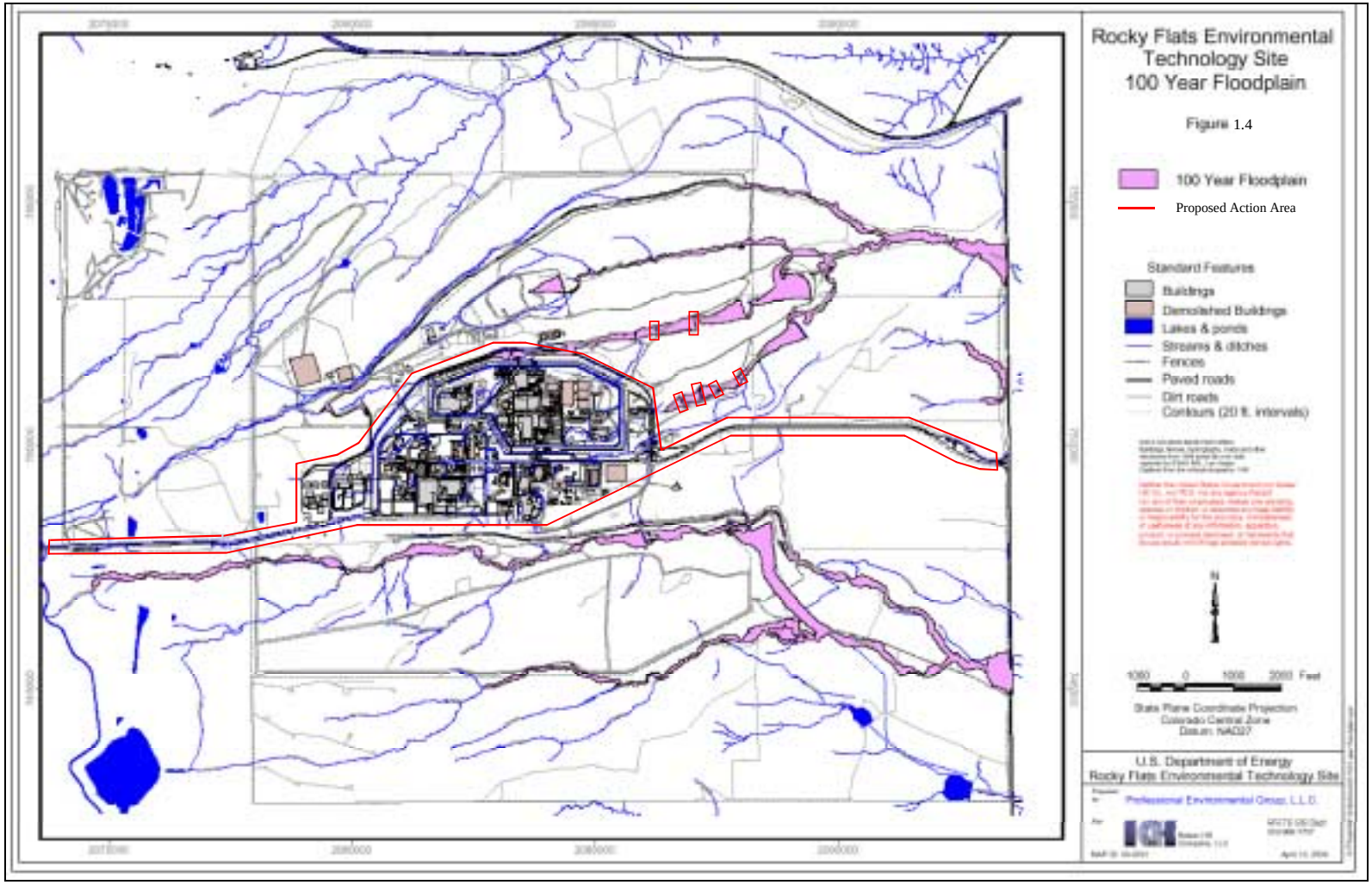
Other surface water structures present at RFETS exist that are not being effected by the actions proposed in this EA. Safety upgrades to the C-1 dam will be implemented in 2004 and are covered by a NEPA Categorical Exclusion (CFRa). An analysis of the C-2 outlet works will be completed to determine if upgrades to that structure are necessary. If necessary, this action will be subject to the appropriate level of NEPA analysis. The South Interceptor Ditch may undergo modification to be described in the Original Landfill IM/IRA, and the Present Landfill Pond will not be modified from its current configuration.

Additionally, configuration of the Site to a stable and more functional state would be consistent with the Site's transfer to USFWS for use as a National Wildlife Refuge. Actions to this end considered non-CERCLA activities, including removal of access roads to the central portion of the Site, removal of parking lots, general contouring to promote stormwater runoff, and removal of major stormwater runoff structures that would no longer be required. These activities are primarily focused in the IA (see Figure 1-1, Industrial Area). The locations of all of these proposed actions are shown in relation to the current 100-year floodplain at the Site (Figure 1-4).

Other activities have been identified that may have impacts to the environmental resources analyzed in this EA. These activities are primarily governed by RFCA, and the required environmental analyses for these actions would be incorporated in RFCA decision documents and are outside the scope of this EA. These RFCA actions are assumed to be completed prior to the proposed actions in this EA beginning. Potential activities that may require further environmental analysis include:

- Removal of sediment within interior ponds if action levels are exceeded; and
- Depletion of available water to North and South Walnut Creek Drainages.

Figure 1-4. Rocky Flats Environmental Technology Site 100 Year Floodplain



1.3 EA Baseline Configuration – A and B Series Ponds

This EA assesses potential impacts that the proposed actions would have on a future "baseline" configuration of the Site. This EA does not assess the impacts that the proposed actions will have on the *current* Site configuration and ecology. The baseline configuration is identified for this EA because other actions are planned, as part of the RFETS closure process, which will occur in addition to the actions proposed in this EA. These other actions will also have impacts, but are separate from the actions and impacts addressed by this EA. Therefore, these other actions are incorporated into the baseline, so that the proposed actions in this EA can be assessed on their own. Those other actions, which are not proposed in this EA but are incorporated into the baseline, are discussed below.

Several RFETS closure activities are planned that will affect habitat located in the North and South Walnut Creek drainages, including wetlands. These activities could include:

- Decommissioning the WWTP;
- Eliminating imported water to the Site; and
- Eliminating impervious surfaces (buildings and pavement) in the IA.

These actions will all reduce water availability to the North and South Walnut Creek drainages and impact the existing habitats by reducing the amount of existing wetlands. The majority of these transformations will occur between the time this EA is prepared and the implementation of the actions that are described in this EA.

In order to evaluate the proposed actions to the A and B series ponds, a future Site condition has been projected that accounts for these water depletion activities having taken place. In this future state, the affected areas will have had sufficient time to allow water and associated habitats to equilibrate. Therefore, the future Site condition will be used as the baseline configuration for the A and B series pond actions, as these actions in themselves are not the cause of environmental impacts from water depletion. The future Site condition was projected using a combination of professional subject matter expertise and computerized model predictions from the Site-Wide Water Balance (SWWB) study reports (K-H, 2002b; K-H, 2003a). Impacts associated with water depletion are outside the scope of the EA.

Additionally, the baseline configuration assumes that any required remediation of pond sediments has been completed. As this action is pursuant to RFCA, the environmental analysis would be provided in a RFCA decision document.

1.4 EA Baseline Configuration – Other Non-CERCLA Actions

The other actions analyzed in this document – removal of access roads, removal of parking lots, general contouring, and removal of major stormwater runoff structures – occur outside the drainages and would not be affected by the water depletion issues described above. Therefore, unless otherwise noted, the baseline configuration for these actions will be the conditions currently observed at the Site.

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2.0 RANGE OF ALTERNATIVES FOR A AND B SERIES PONDS

In the interest of long-term stewardship of water resources at RFETS, DOE proposes modifying several dams in the North and South Walnut Creek drainages. The objectives for the modification are to:

- Create a pond and drainage system that requires less active management than the current system.
- Preserve wetlands and habitat to the extent practicable, in a manner that is compliant with applicable regulations.
- Modify the dams in a configuration that allows them to be reclassified from jurisdictional to non-jurisdictional dams under State Engineer's Office regulations, while simultaneously achieving the first two objectives.

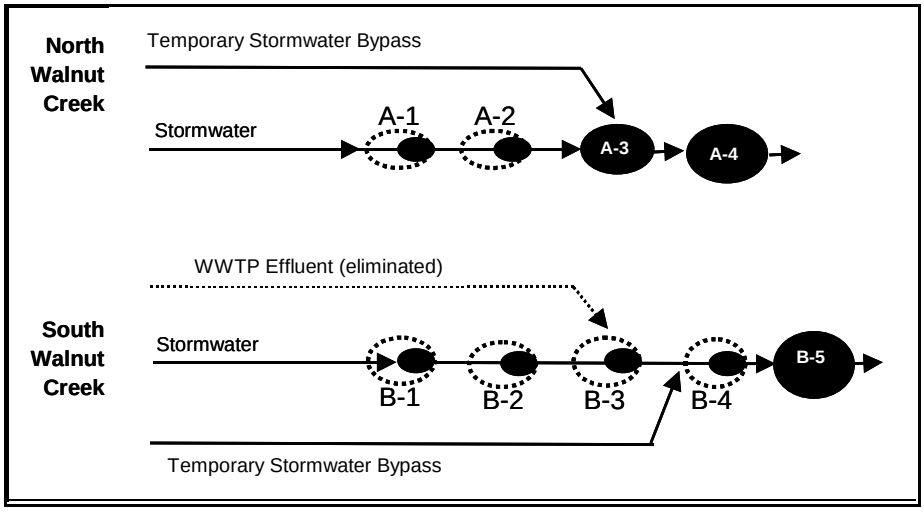
This EA discusses the proposed modification, one alternative, and a no action alternative, as follows. The proposed modification involves maintaining three ponds in their existing configuration, modifying the remaining six ponds by reducing their effective storage capacities, and keeping available the stormwater bypass structures on North and South Walnut Creeks. The alternative action is similar, and involves maintaining terminal Ponds A-4 and B-5 in their existing configuration, fully breaching the interior ponds, and keeping available the bypass structures on North and South Walnut Creeks.

The proposed action for modifying the dams is presented in Section 2.1. The alternative action is presented in Section 2.2. The no action alternative and additional alternatives not considered in detail are discussed in Sections 2.3 and 2.4 respectively.

2.1 Proposed Action – A and B Series Ponds

In the proposed action, three ponds would remain in their existing configuration (interior Pond A-3, and terminal Ponds A-4 and B-5) and six ponds would be modified (Ponds A-1, A-2, B-1, B-2, B-3, and B-4). The bypass structures on both North and South Walnut Creeks would remain in a functional configuration, but could be closed to allow drainage through all of the modified ponds. Modification to the six ponds would include reducing the height of the dams and therefore the size of the ponds to create a more passive, flow-through system. A general schematic of the proposed action is shown in Figure 2-1. The individual elements of the proposed action are discussed in Sections 2.1.1 through 2.1.5.

Figure 2-1. Proposed Action Flow Routing – North and South Walnut Creek Ponds



2.1.1 Maintain Existing Configuration – Terminal Ponds A-4 and B-5

Under the proposed action, North Walnut Creek terminal Pond A-4 (approximately 32.1 million gallon capacity) and South Walnut Creek terminal Pond B-5 (approximately 24.0 million gallon capacity) would be maintained in their existing condition. Both ponds would continue to be operated using the batch-release protocol that is currently employed to manage pond discharges.

Ponds A-4 and B-5 would be maintained for two reasons. First, these ponds improve water quality by holding the water long enough for suspended solids to settle out. Since these terminal ponds are the largest ponds in their respective drainages, and thereby provide the longest residence times, they provide the most improvement in water quality of any ponds in the existing pond network. The second reason for maintaining the terminal ponds is for flood control. Removing all of the dams and the stormwater protection these ponds provide would change the hydrology of the basin and potentially expose downstream development to increased risk from flood hazards. However, the importance of this second reason for maintaining the terminal ponds may be partially diminished as future runoff volumes from the Site decrease, as discussed below.

Although the dams at Ponds A-4 and B-5 would remain unchanged and continue to operate in the same manner as they are currently, the volume of water routed through these ponds would be reduced in the future. Stormwater runoff volumes generated from the IA would be significantly diminished in both North and South Walnut Creeks, compared to current runoff conditions (K-H, 2002b), as a result of buildings and pavement being eliminated from the watershed. In addition, treated effluent from the WWTP, which historically comprises more than half the volume routed through South Walnut Creek, would be eliminated when the Site ceases to import water and the WWTP is decommissioned in late 2004 or 2005.

Future inflow volumes in North and South Walnut Creek, above the dams, based on an IA configuration with buildings and pavement removed, were predicted using computer

model simulations described in the SWWB study reports (K-H, 2002b). A comparison of current versus future predicted inflow volumes for North and South Walnut Creeks is provided in Table 2-1. The future annual inflow volumes are based on the Water Year (WY) 2000 climate (13.8 inches of precipitation), which is slightly below the annual precipitation average for the Site (14.8 inches) (K-H, 2002b).

Table 2-1. Comparison of Discharge Volumes for Water Year 2000 – Current Site Configuration versus Prediction for Future Site Configuration

Discharge Volume variable	North Walnut Creek		South Walnut Creek	
	Current Configuration (acre-feet)	Future configuration (acre-feet)	Current Configuration (acre-feet)	Future configuration (acre-feet)
Annual volume (for WY2000)[1]	133 43.3 Mgal	45 14.6 Mgal	286 93.2 Mgal	8 2.6 Mgal

References:
1) K-H, 2002b

2.1.2 Maintain Existing Configuration – Pond A-3

In the proposed action, North Walnut Creek interior Pond A-3 (with approximately 12.4 million gallons of capacity) would be maintained in its existing condition. The pond would be operated using the current batch-release protocol to manage pond discharges. However, as shown in Table 2-1, the inflow to Pond A-3 from the IA in the baseline configuration is predicted to be approximately 65 percent lower for an average precipitation year. Therefore, the number of discharges from Pond A-3 would be significantly fewer than the current number. Currently four to seven discharges are released from Pond A-3 per year, depending on precipitation. This number of discharges would be reduced to three discharges per year after Site closure during an average climate year because of the reduced flow in North Walnut Creek (K-H, 2002b).

With Pond A-3 acting as an upstream detention basin, Pond A-4 could remain isolated from additional inflow. This is the primary reason for maintaining Pond A-3 in its current configuration, along with providing more storage capacity for stormwater. This allows North Walnut Creek to be configured so that Pond A-4 can be isolated from the watershed upstream while water is either: 1) being stored, or 2) being discharged to flow off the Site.

2.1.3 Modify Interior Ponds – A-1, A-2, B-1, B-2, B-3, B-4

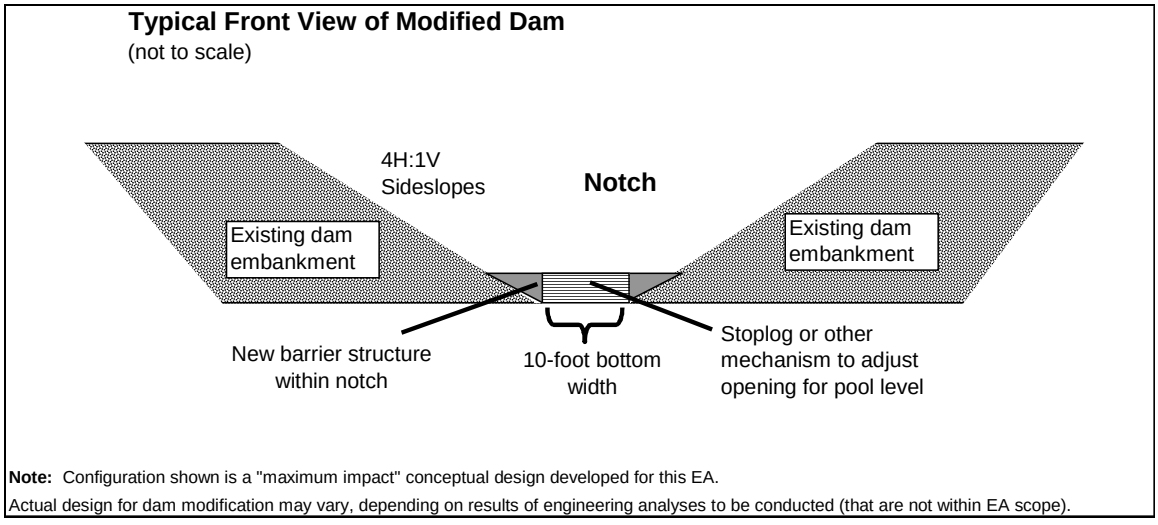
The proposed action calls for modification of six interior ponds: two ponds on North Walnut Creek (Ponds A-1 and A-2) and four ponds on South Walnut Creek (Ponds B-1, B-2, B-3, and B-4). As noted earlier, the purpose of the proposed modifications is to: 1) create a pond and drainage system that requires less active management than the current system, 2) preserve wetlands and Preble's mouse habitat to the extent practicable, and 3) modify the dams such that they can be reclassified from jurisdictional to non-

jurisdictional dams under State Engineer's Office regulations, if possible, while achieving the first two objectives.

To modify the interior ponds, a "notch" would be cut into each dam to reduce its effective height (Figure 2-2), thus creating a lower-profile. To estimate the area of impact for each modified dam, a slope of 4H:1V was used for the sides of the notch. The conceptual design for each notch, developed to determine the maximum probable impact for reconfiguring the dams, was based on the assumption that the invert (bottom) elevation of the notch would be the same as the pond bottom elevation. The notch, the downstream slope of the dam below the notch, and a section of channel below the dam would be armored to provide erosion protection. A new structure would be constructed inside each notch to detain the water in the pond, using a "stop-log" or gate structure to allow some flexibility in pool level management. Pool levels would be based on achieving the objective of preserving wetlands and habitat to the extent possible, based on the amount of available water.

A typical notch configuration for the conceptual design is displayed in Figure 2-2. The notch configuration shown is a conceptual design developed for this EA. The actual design for the dam modifications may vary, depending on the results of engineering analyses that are not within the scope of this EA.

Figure 2-2. Typical Front View of Modified Dam



The expected pool levels would be estimated based on their projected "baseline" levels, to the extent practicable, to preserve fringe wetlands. SWWB model projections for expected pool levels, based on available water post-closure were used to determine the projected pool levels for the modified dams, with the exception of Pond A-2. Pond A-2 is relatively deep, compared to the other interior ponds, with an approximate mean depth of 11 feet. The Pond A-2 average pool elevation was assumed to be lowered in the proposed action by approximately 6 feet. Maintaining a lower pool elevation would generally enhance dam safety, as well as satisfy the requirements for reclassifying the pond as "non-jurisdictional" in accordance with State Engineers Office regulations.

For the modified dams, the proposed elevations of the notch invert and average pool level are listed in Table 2-2. These elevations were used to assess the impacts from the proposed action, as discussed in Section 5.

The notch configuration for each dam, the dam and drainage erosion armoring, and the drainages as a whole, will be subjected to hydraulic and hydrologic engineering evaluations, including flood routing analyses, as part of the design for this pond reconfiguration effort. Specific sections of the drainage channels that have existing areas with high erosion rates (e.g., below Pond B-4) will require extra attention during the engineering design phase to address long-term channel erosion concerns. This is consistent with the floodplain management objective to reduce erosion, to the extent practicable, as reflected in the overall drainage design. These types of engineering analyses are not, however, within the scope of the EA.

Removed dam material may be reused onsite (as fill material) outside of the Preble's mouse habitat and wetlands, or shipped offsite. Similarly, staging of construction materials and equipment (yet to be determined) during reconfiguration would be planned to avoid if possible, or to create the minimal disturbance possible to wetlands and sensitive habitat.

Table 2-2. Proposed Action – Elevations of Notch Invert and Average Pool Level for Modified Dams

Drainage	Dam	Proposed Elevation of Notch Invert (Ft – AMSL)[1]	Proposed Average Pool Elevation (Approximate) (Ft – AMSL)[2]
North Walnut Creek	A-1	5,823	5,823
	A-2	5,800	5,803
South Walnut Creek	B-1	5,875	5,876
	B-2	5,860	5,863
	B-3	5,846	5,847
	B-4	5,832	5,834

[1] The proposed elevation of the notch invert is the same elevation as the pond bottom. This configuration represents a maximum amount of disturbance to the dam, for the purposes of the EA. Elevation is expressed as feet above mean sea level (ft AMSL).

[2] For the purposes of the EA, the proposed average pool elevation for each pond would be achieved by stop logs or other adjustable structure constructed within each dam's notch. The proposed pool elevation is the same as the average pool elevation predicted for the baseline configuration by the SWWB model, with the exception of Pond A-2. The average Pond A-2 elevation is lowered by approximately 6 feet so that the A-2 dam can be reclassified as non-jurisdictional.

2.1.4 Temporarily Maintain Existing Configuration – Bypass Structures

In the proposed action, the bypass structures on North and South Walnut Creeks would be kept intact, although some minor modifications may be required to accommodate operating protocols for the drainages. Currently, in North Walnut Creek, the gates in the concrete diversion structure, located upstream from Pond A-1, are typically configured to route flows from the IA around Ponds A-1 and A-2, by means of a pipeline that

discharges into Pond A-3 (see Figure 1-3). In South Walnut Creek, the gates in the concrete diversion structure, located upstream from Pond B-1, are typically configured to route flows from the IA around Ponds B-1, B-2, and B-3 by means of a pipeline that discharges into Pond B-4.

The general configuration of these bypass structures would remain the same in the proposed action. However, the pipelines that route water into Ponds A-1 and B-1 are currently corrugated metal pipes with relatively small (12-inch) diameters. Therefore, some enlargement of these pipelines, or modification to the concrete diversion walls, is proposed to allow larger flows to pass by the diversion walls and flow into the North and South Walnut Creek channels (Ponds A-1 and B-1 respectively).

The primary reason for keeping the bypass systems in place, in both North and South Walnut Creek, is to protect water quality in the near-term during the construction to reconfigure the interior ponds. Diverting flow around the ponds would allow vegetation to become re-established without being washed out, thereby reducing erosion in disturbed areas. This would improve water quality by reducing suspended sediment concentrations in the modified drainages. After the vegetation is well established in the modified drainages, the bypass gates could be reconfigured to divert runoff directly through the modified interior ponds.

A second reason for maintaining the bypass structures is future operational flexibility. After the vegetation has been re-established, the bypass structures would allow for water to be temporarily routed around interior Ponds A-1 and A-2 (North Walnut Creek) and B-1, B-2, and B-3 (South Walnut Creek), if maintenance work is being performed in these areas.

While the need for long-term maintenance of the bypass structures (including corrugated metal pipe) is recognized, it is not within the scope of this EA. Accordingly, the need for long-term maintenance of other related structures, such as valve gates, outlet works, or drainage channels is also recognized but beyond the scope of this EA.

2.1.5 Water Routing and Management

The resulting flows after the proposed action would be captured in Pond A-4 (North Walnut Creek) and Pond B-5 (South Walnut Creek) and held. After Ponds A-4 and B-5 reach prescribed levels (approximately 50 percent full), they would be sampled and discharged using the batch-release operating protocol. Pond A-4 discharges would continue to involve an isolated batch, as currently occurs, because Pond A-3 would be also be maintained in its current configuration that allows Pond A-4 to be isolated. The bypass structures would allow revegetation of the disturbed drainages until the proposed flow pattern is complete.

As discussed, decreased flows in North and South Walnut Creeks after closure will provide less available water, compared to current conditions, for discharges from Ponds A-3, A-4, and B-5. In order to support downstream habitat more effectively, consideration may be given to future pond operations that involve smaller, more frequent

discharges of water. However, future operations will also take into consideration the changing system, from one dominated by pond discharges to a more functional one that represents the expected condition of an intermittent stream in a semi-arid environment.

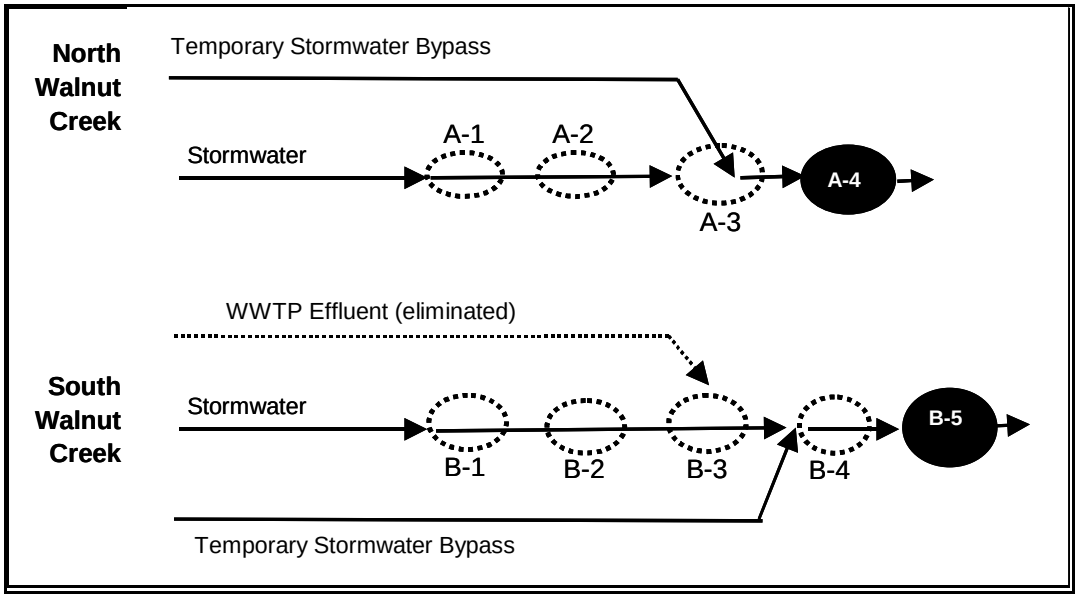
2.2 Alternative Action – A and B Series Ponds

The alternative pond reconfiguration action evaluated in this EA involves: 1) maintaining terminal Ponds A-4 and B-5 in their existing configuration, similar to the proposed action, 2) fully breaching all of the interior ponds, and 3) keeping the bypass structures on North and South Walnut Creeks. A general schematic of the proposed action is shown in Figure 2-3. Detail for the alternative action is provided in Sections 2.2.1 through 2.2.4.

2.2.1 Maintain Existing Configuration – Terminal Ponds A-4 and B-5

In the alternative action, terminal Ponds A-4 and B-5 would remain in their existing configuration, similar to the proposed action (see Section 2.1.1). The operating protocol would also remain the same, using a batch-release methodology in both drainages. However, Pond A-3 would be removed in this alternative (see Section 2.2.2), and Pond A-4 would not be isolated from inflows, as is now the case and would continue to occur in the proposed action. Therefore, with this alternative, when Pond A-4 is being discharged, it would continue to receive runoff from the North Walnut Creek watershed.

Figure 2-3. Alternative Action Flow Routing – North and South Walnut Creek Ponds



2.2.2 Remove Interior Ponds – A-1, A-2, A-3, B-1, B-2, B-3, B-4

This alternative involves completely breaching and removing the dams at all seven interior ponds. The drainage channels would be stabilized appropriately for erosion

protection, and the pools, wetlands, and associated habitat would be impacted accordingly.

2.2.3 Temporarily Maintain Existing Configuration – Bypass Structures

The bypass structures on North and South Walnut Creeks would be maintained temporarily to allow revegetation in the channel bottoms by routing flows around the disturbed soil of Ponds A-1, A-2, B-1, B-2, and B-3. However, the bypass structures cannot be configured to re-route flows around Ponds A-3 and B-4, even though these ponds would be removed in this alternative. Therefore, different measures for routing flows around these ponds would have to be implemented during removal.

2.2.4 Water Routing and Management

In the alternative action, flows would be captured in Pond A-4 (North Walnut Creek) and Pond B-5 (South Walnut Creek) and held. After Ponds A-4 and B-5 reach prescribed levels, they would be discharged using the batch-release operating protocol. However, Pond A-4 discharges would no longer involve an isolated batch, as currently occurs, because Pond A-4 could not be isolated if Pond A-3 were removed. The bypass structures would allow revegetation of the disturbed drainages until the proposed alternative flow pattern is complete.

As discussed, decreased flows in North and South Walnut Creeks after closure will provide less available water, compared to current conditions, for discharges from Ponds A-3, A-4, and B-5. In order to support downstream habitat more effectively, consideration may be given to future pond operations that involve smaller, more frequent discharges of water. However, future operations will also take into consideration the changing system, from one dominated by pond discharges to a more functional one that represents the expected condition of an intermittent stream in a semi-arid environment.

2.3 No Action Alternative – A and B Series Ponds

The No Action Alternative involves no change to the existing configuration of ponds and bypass structures in North and South Walnut Creek (see Figure 1-3). If the No Action Alternative is implemented, water would be permanently routed through the existing bypass structures and batch-released from Ponds A-3, A-4, and B-5 using the current operating protocol. Operation and maintenance of the system would require maximum resources.

2.4 Alternatives Not Analyzed In Detail

Several alternatives for pond reconfiguration were identified but not analyzed in detail, based on problems recognized early in the evaluation process. These alternatives are described briefly in Sections 2.4.1 through 2.4.4.

2.4.1 New Walnut Creek Terminal Pond

Construction of a new terminal pond was identified as a potential alternative. The new pond would be constructed on Walnut Creek downstream from the confluence of North and South Walnut Creeks at a location west of the RFETS boundary on Indiana Street. The new pond would be used to settle suspended solids immediately upstream from the Site boundary, thus capturing a larger portion of the RFETS Walnut Creek watershed. The current ponds would remain in their existing configuration.

This alternative would disturb large areas of Preble's mouse habitat along Walnut Creek. In addition, water quality is already in continuous compliance with the RFCA standards at the Point of Compliance location at Indiana Street (GS03). Therefore, the utility of the additional pond proposed in this alternative is questionable. For these reasons, this alternative was not evaluated further.

2.4.2 Removal of All Interior Ponds and Bypass Structures

Removing all ponds, except for terminal Ponds A-4 and B-5, and concurrently removing the bypass structures was initially identified as a pond reconfiguration option. However, the potential near-term impacts to water quality caused by routing flows through the disturbed soil of the newly removed interior ponds, along with impacts to wetlands and Preble's mouse habitat, resulted in this alternative being removed from further consideration.

2.4.3 Maintain Terminal Ponds, Modify Interior Ponds, and Remove Bypass Structures

An alternative somewhat similar to the proposed action was considered, in which Ponds A-4 and B-5 would be maintained in their existing configuration, all of the interior dams would be lowered (via notching) for a flow-through configuration, and the bypass structures would be removed. This alternative was not evaluated further for two reasons: 1) it does not offer the near-term protection of water quality provided by keeping the bypass structures (which allow flows to be routed around newly disturbed soil), and 2) modifying Pond A-3 reduces its storage capacity and eliminates the capability to isolate Pond A-4 from inflows during discharges.

2.4.4 Maintain Terminal Ponds, Modify Select Interior Ponds, Remove Select Interior Ponds, and Remove Bypass Structures

The final alternative that was not evaluated involved: 1) maintaining the terminal ponds in their current configuration, 2) modifying Ponds A-3, B-3, and B-4 into a lower-profile, flow-through configuration, 3) removing the remaining interior ponds (A-1, A-2, B-1, and B-2), and 4) removing the bypass structures. Again, the potential impacts to near-term water quality caused by removing the bypass structures, as well as the short-term impacts to wetlands and habitat caused by completely removing four interior ponds, caused this alternative to be removed from further consideration.

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3.0 RANGE OF ALTERNATIVES FOR OTHER NON-CERCLA CLOSURE ACTIVITIES

A stable and more functional configuration for the Site would be consistent with the USFWS plans for a National Wildlife Refuge. This change would include the removal of access roads to the central portion of the Site, removal of parking lots, general contouring to promote stormwater runoff (including construction of new engineered functional channels), and removal of major stormwater runoff structures that would no longer be required. The proposed action for the other Non-CERCLA closure activities is discussed in Section 3.1, and the No Action Alternative is discussed in Section 3.2. One alternative that was not analyzed in detail is provided in Section 3.3.

3.1 Proposed Actions – Other Non-CERCLA Actions

The proposed actions to return the Site to a stable and more functional configuration include removing asphalt from the access roads, removing parking lots, excavating soils from an area west and south of Building 371/374 to re-contour the area, and configuring the IA. These activities are described in detail in the following sections.

3.1.1 Asphalt Removal

In the proposed action, asphalt would be removed from access roads to the central portion of the Site, including the East and West Access Roads and the North Perimeter Road, as well as removal of parking lots. A one-lane road consisting of remaining road-base would be retained on the West Access Road. Other roads and parking lots would be removed completely and revegetated. Grading of roads and removal of drainage ditches will be evaluated on a case-by-case basis. Limited grading would be conducted as needed to promote overland flow of stormwater. Roads and parking lots would be revegetated consistent with the existing RFETS Revegetation Plan (K-H, 2004b).

3.1.2 Drainage Area West of Building 371/374

In order to establish a drainage pattern west of Building 371/374 that feeds North Walnut Creek, an area south and west of Building 371/374 would require excavation below the "original" grade for that area. The excavated soils would be used to fill IA building basements or other low areas that exist after building removal. The upper portion of this area above the original grade is currently used as a borrow area. This previously disturbed soil was placed there in the 1980's and supported a small trailer complex. The use of this borrow material down to the original grade was previously evaluated under separate analysis. Areas that have not been previously disturbed (below original grade) would be excavated to create the new drainage. Establishment of this drainage would complement the stable and more functional end state desired. At completion, the areas would be revegetated accordingly.

3.1.3 Industrial Area Configuration

The general concept for IA Land Configuration is to provide a land surface consistent with the end use of the facility as a wildlife refuge. The goals of the IA Land Configuration are to:

- Minimize total earthwork scope;
- Provide positive surface water drainage;
- Maintain geotechnical stability;
- Limit erosion, specifically in the drainage ditches; and
- Minimize habitat and wetland impacts.

The IA Land Configuration includes the following major activities:

3.1.4.1 IA Grading

When the buildings and facilities are removed from areas within the IA, limited grading would be conducted to promote Site drainage consistent with the IA Land Configuration Conceptual Design Grading Plan (Revision 1, March 2004) (K-H, 2004a). Generally, the grading at buildings and facilities would match the existing area grades surrounding the building or facility. Some existing drainage ditches and/or swales would be retained to assist in directing stormwater flow towards more major drainages. The area would be revegetated consistent with the existing RFETS Revegetation Plan (K-H, 2004b). Any areas that have not recently been disturbed and are adequately drained would not be re-graded. IA grading would not return the IA to a pre-development condition. A map is attached (Figure 3-1) that shows the current plan for IA grading and aids in evaluating impacts from the proposed action (K-H, 2004a). Actual IA grading contours may vary slightly from the current plan as conditions warrant.

3.1.4.2 Culverts and Storm Drains

Many culverts and storm drains would be removed, and others would be plugged at both ends and remain in place. Earthwork would be conducted where culverts or storm drains are removed to either fill the disturbed area up to existing area grades or to grade the area to establish a functional channel. Disturbed areas would be revegetated in accordance with the existing RFETS Revegetation Plan (K-H, 2004b).

3.1.4.3 Functional Channels

Functional channels are defined as newly constructed channels intended to direct stormwater from the IA into the North and South Walnut Creek drainages. The functional channels would be engineered where needed as conceptually shown on the Land Configuration Conceptual Design Grading Plan (Revision 1, March 2004) (K-H, 2004a). The channels would generally be trapezoidal in shape unless

an existing channel is determined to provide adequate flow capacity. Erosion protection would be provided at the bottom and sides of the channels as needed, and covered with soil. Evaluation of the location and number of channels needed by an assessment of expected surface water flow characteristics and general IA grading considerations is currently underway. Other activities associated with the design of the channels include:

- A surface water flow evaluation would be conducted on selected channels to establish the flow conditions for channel design; and
- An evaluation of the erosion would be conducted on selected channels as a part of the channel design. The erosion evaluation would be used to adjust grades in a channel and to address areas of potential erosion.

3.1.4.4 Building Specific Grading Plans

Buildings 371/374, 776/777, 881, 991, and the East End of the Central Avenue Ditch have specific grading plans as included in the IA Land Configuration Conceptual Design Grading Plan (Revision 1, March 2004) (K-H, 2004a). Discussions with CDPHE and DOE continue on these grading plans and could be slightly modified as a result of these discussions and limited groundwater/geotechnical/erosion evaluations at each of these building areas.

3.2 No Action Alternative – Other Non-CERCLA Actions

The No Action Alternative involves no change to the existing configuration of the described areas. Site access roads and parking lots would remain, soils west and south of Building 371/374 that have not been previously disturbed would not be excavated to create a new drainage, and general IA activities to create a stable and more functional configuration would not be performed.

3.3 Alternative Not Analyzed In Detail

One alternative that was considered but not analyzed in detail relates to the drainage area segment of the proposed action. Restoration of the original drainage west of Building 371/374 was considered. However, this alternative action would require a significant amount of excavation, and could result in steep sloping banks that would increase the potential for soil erosion. This alternative therefore was not evaluated further.

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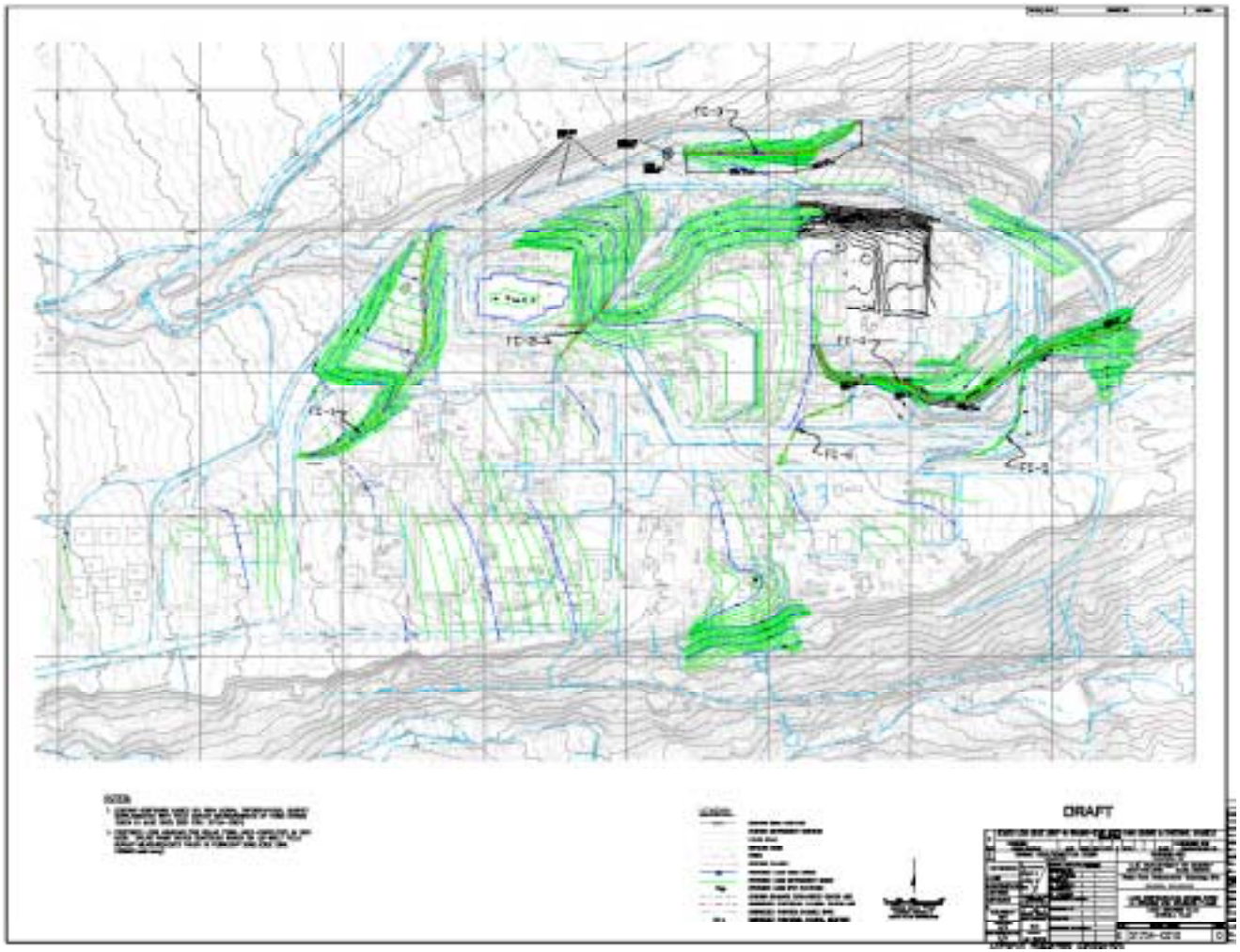
Figure 3-1. IA Grading and Drainage Plan



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4.0 AFFECTED ENVIRONMENT

Descriptions of the environments that would be affected by the proposed actions are provided in this section. As outlined below, ancillary Site closure activities have the potential to change the affected environment before the actions proposed herein are completed. Therefore, a baseline environment has been defined, establishing the future Site environment that will be impacted by the proposed actions. Analysis of impacts associated with the ancillary closure activities (activities other than those proposed by this EA) is outside the scope of this EA.

As previously described, RFETS is located on 6,550 acres in rural northern Jefferson County, Colorado, 16 miles northwest of downtown Denver. The RFETS IA occupies approximately 400 acres in the middle of the Site. The remaining 6,150 acres form a Buffer Zone around the active part of RFETS. The Buffer Zone provides a distance of more than one mile between the developed portion of the Site and any public road or private property. The communities of Arvada, Boulder, Broomfield, Golden, Leyden, Superior, and Westminster surround the Site.

State Highway 128 borders the Site to the north, and Indiana Avenue borders the Site to the east. Land directly north of Highway 128 is largely dedicated to open space. Land east of Indiana Street is zoned industrial/commercial to the north, and open space to the south. The open space is owned by the City of Broomfield and includes the Great Western Reservoir. The remaining land bordering the Site on the east is privately owned and zoned agricultural, with a projected plan showing an open space designation. The land south of the Site is used for grazing and hay production and is zoned agricultural/commercial. The Site is bordered on the west by State Highway 93. The land to the west and southwest (including within the Buffer Zone west of the Industrial Area) is used for quarrying and storage and conveyance of municipal water supplies.

As some of the proposed actions would involve activities in relatively undeveloped areas of the Buffer Zone, they could affect sensitive environmental resources such as wetlands; natural prairie grasslands; wildlife, including threatened and endangered species; and archaeological or cultural resources. In addition, construction activities could potentially affect air and water resources, as well as onsite and offsite human health. The specific resources that may be affected by the proposed action are grouped into the following areas for analysis in this EA:

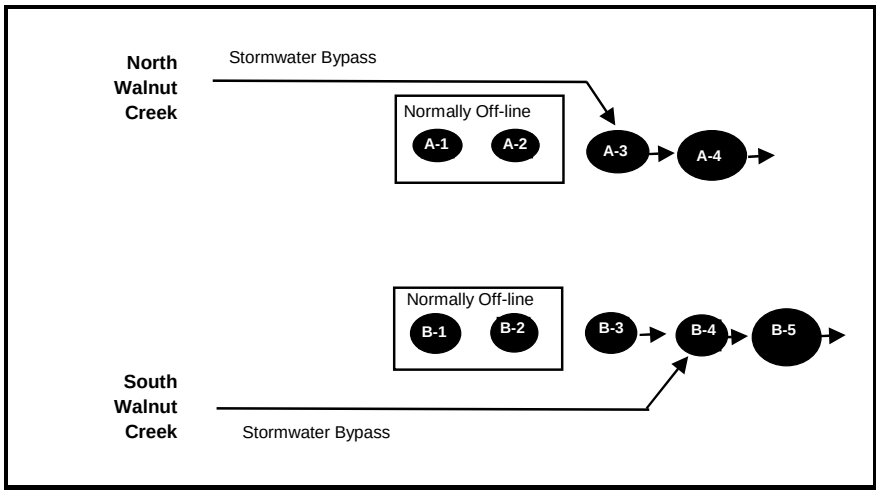
- air quality;
- water quality and quantity;
- ecological resources (including wetlands and threatened and endangered species);
- archeological resources;
- noise; and
- human health.

Other Site closure activities conducted under RFCA have the potential for altering the environment that would be affected by the proposed action. Specifically, water flow would be reduced in the North and South Walnut Creek drainages as a result of:

- Elimination of treated discharges from RFETS WWTP routed to Pond B-3;
- Reduction in the amount of stormwater flow due to reduction in impervious surfaces in the IA; and
- Elimination of imported water routed to Ponds A-1 and B-1 for sediment wetting.

These changes, which are incorporated into the baseline configuration, are reflected in Figure 4-1. The impacts of these changes are separate from the impacts of the proposed actions in this EA. As a result of these other changes, the environment that would be affected by the proposed action differs significantly from conditions that currently exist in the project area. Baseline environmental conditions used as the basis for environmental impact analyses in this EA are described in the following sections. Where applicable, changes in the affected environment resulting from these flow reductions are noted. Impacts resulting from these flow reductions are outside the scope of the EA.

Figure 4-1. Baseline Configuration – Water Routing in A and B Series Ponds



Water reaching the ponds post-closure would consist of direct precipitation, baseflow, shallow alluvial groundwater, and stormwater. The available sources would vary for each pond. Ponds A-1 and B-1 would have significantly reduced water post-closure for two reasons: 1) no water would be provided to keep sediments wet, as has been done in the past, and 2) these ponds are off-channel and their watersheds are relatively small (8.3 and 12.0 acres, respectively). The other ponds currently held off-line, Ponds A-2 and B-2, would not be as severely impacted, because imported water was not necessary to sustain them partially full.

Pond B-3 would have significantly less water since wastewater discharges would cease. Ponds A-3 and A-4 are predicted to have their inflow reduced by more than 60 percent, although this level would be sufficient in an average year for A-3 to fill and discharge

three times and A-4 to fill and discharge once, according to model predictions (K-H, 2002b). Ponds B-4 and B-5 would receive over 95 percent less discharge from the South Walnut Creek drainage as a result of diminished runoff from the IA and elimination of the WWTP discharges. However, continuous baseflow in South Walnut Creek is predicted, therefore allowing Pond B-4 to sustain a relatively constant pool level. This fill level would be slow enough to require more than one year of average inflow before Pond B-5 had to be discharged.

4.1 Biological Resources

Two general types of plant communities exist in the study area: 1) upland grassland communities adjacent to the ponds, and 2) wetland communities within the ponds themselves. These plant communities are described below in terms of the pond modifications and non-CERCLA activities.

4.1.1 Vegetation

A and B Series Ponds

The plant communities adjacent to the ponds (but above the area affected by normal water levels) should not be affected by Site closure activities. These communities include reclaimed mixed grassland, mesic mixed grassland, xeric tallgrass prairie, and wet meadow/marsh ecotone types (K-H 1997). Most of the area adjacent to the ponds consists of reclaimed mixed grassland (where re-seeding was done following construction of the ponds) and mesic mixed grassland communities. Dominant species in the mesic mixed grassland include blue grama (*Boutelou gracilis*), western wheat grass (*Agropyron smithii*), green needle grass (*Stipa viridula*) Kentucky bluegrass (*Poa pratensis*), and Japanese brome (*Bromus japonicus*). The reclaimed grassland areas around the ponds are dominated by smooth brome (*Bromus inermis*) (K-H 1997).

An area of xeric tallgrass prairie dominated by big bluestem (*Andropogon gerardii*), little bluestem (*Andropogon scoparius*), and needle and thread grass (*Stipa comata*) occurs north of the embankment of Pond B-3, and wet meadow/marsh ecotone vegetation exists on the hillside south of Pond B-5. The wet meadow/marsh ecotone includes common cattail (*Typha latifolia*), Baltic rush (*Juncus balticus*), Torrey's rush (*Junicus torreyi*), spike rush (*Eleocharis sp.*), and several other species (USACE, 1994). The wetlands occur at seeps where the base of the Rocky Flats Alluvium and Upper Arapahoe Formation are exposed. According to the SWWB Modeling Report for RFETS (K-H, 2002b), Site closure activities would not significantly reduce groundwater levels at these seeps. Groundwater level change is therefore not predicted to be a factor that would affect the wet meadow/marsh ecotone communities in the North and South Walnut Creek study area addressed by the EA.

Other Non-CERCLA Actions

The proposed drainage area west of Building 371 currently consists of several trailers, parking lots, heavy equipment parking areas, a storage area for sand and gravel, and portions of Sage Avenue and First Street. A small amount of xeric tallgrass prairie and

mesic mixed grassland are present in the area. A small portion of the current Preble's mouse protection area at the Site is present along the edge of the North Access Road and crosses the road and into the proposed drainage area along its western boundary.

Vegetation in the IA consists largely of landscaping plants, many of which are exotic species of grass, shrubs, and trees. The North Perimeter and East and West Access roads are two-lane asphalt roads that enter the Site from the east and west and circle around the north side of the IA. The roads themselves and associated gravel shoulders provide no ecological value to the Site's natural resources. Ecologically, the East and West Access roads fragment the native grasslands that surround them on both sides for most of their length. The West Access Road is surrounded by xeric tallgrass prairie, and the East Access Road is surrounded by mesic mixed grassland. The North Perimeter Road is surrounded largely by disturbed areas on the south side and some reclaimed grassland and xeric tallgrass prairie on the north. The North Perimeter Road also crosses some Preble's mouse habitat in the North and South Walnut Creek drainages. At these locations, however, the road and shoulders are not considered Preble's mouse habitat.

4.1.2 Wetlands

A and B Series Ponds

Wetland plant communities exist along the shoreline and within the ponds, and also in the channels between the ponds. The extent of wetlands and the species present vary, depending on the hydrologic characteristics, hydric soils, and depth of water of the ponds. For example, Ponds A-2 and B-4 are relatively shallow and are wet throughout much of the growing season. Wetland vegetation currently occupies much of these ponds. In contrast, the terminal Ponds A-4 and B-5 are deeper with wetlands limited to areas along the shoreline. Zonation of vegetation also occurs within the ponds with emergent herbaceous species such as common cattail in the middle of the shallower ponds where deeper more permanent water exists, surrounded by a ring of sand bar willow (*Salix exigua*) and other dryer species along the shoreline. Wetland species common to the ponds include common cattail, bulrush (*Scirpus validus*), sand bar willow, Nebraska sedge (*Carex nebrascensis*), smartweed (*Polygonum lapathifolium*), and other species (USACE 1994).

Wetland and riparian vegetation also exist along the channels of North and South Walnut Creeks between the ponds in the study area. This vegetation includes sand bar willow, narrow leaf cottonwood (*Populus angustifolia*), plains cottonwood (*Populus deltoides*), and several herbaceous species (USACE 1994). The riparian and wetland communities are closely associated with the channels due to their generally incised nature.

A 1996 EA (DOE, 1996a) contains additional descriptions of the wetlands environments present at the Site. It should be noted that the 1996 EA was written to assess the impacts from maintaining surface water features at the Site assuming the hydrology associated with a full IA configuration. This 2004 EA is based on the future baseline configuration of the Site, with reduced runoff volumes and no WWTP discharge to South Walnut Creek.

Wetland Baseline Condition for Impact Assessment

The limit of the existing wetland plant community at each pond generally coincides with the normal water level of the pond. This indicates that the wetlands are generally sustained by water in the ponds. Adjacent groundwater does not sustain the wetlands adjacent to the ponds. However, groundwater does sustain the wetlands between the ponds. The amount of water in both drainages will be significantly reduced by Site closure activities. For example, the average annual baseflow in North and South Walnut Creeks is projected to be reduced by approximately 30 and 80 percent, respectively, for the WY2000 SWWB model simulation for a post-closure Site configuration (K-H, 2002b). When other variables besides baseflow are considered, such as reduced storm runoff from the IA and discontinuation of WWTP discharges to South Walnut Creek, the total volume discharged to North and South Walnut Creeks is projected to be reduced by nearly 70 and 97 percent, respectively (see Table 4-6). WY2000 is representative of average precipitation conditions (14.8 inches per year). It is noted that the currently planned IA post-closure configuration has been modified somewhat from the future Site configuration used in the SWWB study. However, the future Site configuration used for the SWWB incorporated the key components that are the major factors of the changing water balance at the Site (elimination of WWTP discharges to South Walnut Creek, and removal of IA impervious surfaces and associated runoff). Because of this, the SWWB provides a realistic general basis for projecting future ecological conditions resulting from these flow reductions.

The reduction in water supply will affect the nature and extent of the wetlands associated with the ponds, regardless of the alternative selected for the pond embankments. Therefore, an analysis was completed to define the "baseline" condition with respect to the extent and nature of wetlands associated with the ponds, post-closure.

The effects of the post-closure water supply on the ponds and associated wetlands were evaluated by assessing the impacts of predicted post-closure water levels in the ponds from the SWWB model (K-H, 2002b). Changes in pond water levels would affect the amount of standing water and saturated soil in the ponds that could support wetland vegetation. The SWWB model indicated that average post-closure pond levels would be lowered approximately 0.2 feet to 4.4 feet, depending on the pond, from existing average levels, except for Pond A-3. Pond A-3 was predicted to have an annual average level increase of approximately 0.2 feet compared with current conditions. This predicted minor increase is an artifact of the filling and discharge cycles predicted for Pond A-3 for WY2000, so no change in level was assumed for the analysis. Stage-pond surface area curves for each pond were used to determine the reduction in wetted area by the drawdown (Merrick, 1992). The results of this analysis are summarized in Table 4-1. As these conditions require a forward-looking projection, unquantified uncertainties lie within these projections.

It was assumed that the change in wetland area would be proportionate to the change in pond area for the following reasons:

1. The wetlands associated with the ponds are sustained by surface water and limited shallow groundwater along the two drainages. Side-slope groundwater, in the form of seeps and springs, does not sustain the wetlands, as evidenced by the fact that the limit of wetlands is closely associated with the normal water level of each pond.
2. The existing vegetation exhibits zonation due to water depth and the degree of saturation, and this indicates the vegetation is responsive to changes in the amount of water available.
3. Changes in average water levels are indicative of the amount of inundation and saturated soils that would exist post Site closure.
4. Shallow pond evaporation rates are similar to wetland evapotranspiration rates.

The results of this evaluation—estimated post-closure baseline vegetation conditions in the ponds—are summarized in Table 4-2. Table 4-2 shows that the area of ponding and wetlands would be reduced at all ponds in the post-closure baseline condition, except for Pond A-3, which would be similar to existing conditions. Pond A-1 would likely not support any pond area or wetlands post closure, and the amount of pond and wetlands would be significantly reduced in Ponds B-1 and B-3 (approximately 50 and 80 percent reductions, respectively). The amount of pond and wetlands would be reduced more in South Walnut Creek due to the elimination of WWTP discharges, which provides more than half of the water to the South Walnut Creek ponds in existing conditions. The area of pond and wetlands in the baseline configuration, compared to the current configuration, is predicted to be reduced by approximately 1.5 acres in North Walnut Creek, and by 2.5 acres in South Walnut Creek, for a total approximated reduction of 4 acres.

In ponds with a significant reduction in water supply (Ponds A-1, B-1, and B-3), a relatively rapid shift to upland species would occur for the baseline condition. Obligate wetland species such as common cattail, bulrush, sand bar willow, and water smartweed would likely not be able to survive. The dryer conditions and more seasonal water supply for these ponds would favor more facultative species such as barnyard grass (*Enchinocloa crusgali*), retop (*Agrostis alba*), western wheat grass, curley dock (*Rumex crispus*), and Baltic rush. Upland species, including weeds, may also proliferate in these ponds. The wetland functions of these ponds would likely be significantly reduced post-closure.

Similar changes in vegetation would occur at Ponds B-2 and B-5, only on a more gradual basis. The potential exists for invasion of these ponds by upland weeds (e.g., creeping thistle—*Circium arvense*, and kochia—*Kochia* sp), particularly in the transition area on the upland side of the wetlands. The larger the reduction in the water supply, the greater and more rapid the change in vegetation. The wetland functions of these ponds would likely be reduced to a moderate extent, but not entirely eliminated.

Table 4-1. Post-Closure Pond Drawdown Analysis

Pond	Existing				Post-Closure (Approximated Baseline Condition)			
	Elevation Normal Water Level[1] (Ft-AMSL)	Water Surface[2] (Acres)	Wetlands[3] (Acres)	Water Surface plus Wetlands (Acres)	Elevation Normal Water Level[1] (Ft-AMSL)	Water Surface[2] (Acres)	Wetlands (Acres)	Water Surface plus Wetlands (Acres)
A-1	5,824.2	0.37	0.72	1.09	5,822.2	0	0	0
A-2	5,809.6	1.20	1.50	2.70	5,808.9	1.1	1.4	2.5
A-3	5,785.2	2.35	1.18	3.53	5,785.4	2.4	1.2	3.6
A-4	5,746.9	4.20	1.54	5.74	5,746.5	4.0	1.5	5.5
Total A Ponds		8.12	4.94	13.06		7.5	4.1	11.6
B-1	5,877.5	0.44	0.31	0.75	5,876.0	0.2	0.2	0.4
B-2	5,865.0	0.60	0.38	0.98	5,863.0	0.4	0.3	0.7
B-3	5,848.5	0.31	0.26	0.57	5,846.6	0.1	0.1	0.2
B-4	5,834.0	0.15	0.58	0.73	5,833.8	0.1	0.5	0.6
B-5	5,792.1	2.82	0.46	3.28	5,787.7	1.9	0.3	2.2
Total B Ponds		4.32	1.99	6.31		2.7	1.4	4.1
Grand Total		**12.44**	**6.93**	**19.37**		**10.2**	**5.5**	**15.7**

[1] From SWWB Model, 2000 conditions. Average water level data were used instead of mode water levels since the latter are not as indicative of the limit of wetlands.

[2] From stage area graphs for ponds (Appendix A).

[3] From USACE, 1994

Table 4-2. A- and B- Ponds Baseline Condition with Plan Closure

Pond	Existing Condition	Post-Closure (Approximated Baseline Condition)		
		Water Supply	Wetlands	% Change in Pond plus Wetlands
A-1	• Pond off-channel. • Water added to keep sediments dry. • Much of pond is wetland.	• Pond still off-channel. • No water to be added. • Water supply would be significantly reduced.	• Vegetation would naturally revert to upland community.	-100%
A-2	• Off-channel, but pond intercepted shallow groundwater to support wetlands.	• No significant change in water supply.	• No significant change in wetlands.	-10%
A-3	• Receives stormwater runoff from plant Site. • Some on-channel baseflows.	• Total water supply reduced by over 60% (avg. year) (A-3 pond fill/discharge cycle less frequent)	• No significant change in wetlands.	0
A-4	• Receives stormwater runoff from plant Site. • Some on-channel baseflows.	• Total water supply reduced by over 60% (avg. year) (A-4 pond fill/discharge cycle less frequent)	• No significant change in wetlands.	-5%
B-1	• Pond off-channel. • Water added to keep sediments dry. • Much of pond is wetland.	• Pond still off-channel. • No water to be added. • Water supply would be significantly reduced.	• Vegetation would revert to upland community.	-50%
B-2	• Off-channel, but pond intercepted shallow groundwater to support wetlands.	• Water supply would be reduced.	• Vegetation would revert to upland community.	-30%
B-3	• Pond received treated wastewater.	• Wastewater would cease. • No significant supply for pond.	• Vegetation would revert to upland community.	-80%
B-4	• Pond received stormwater runoff. • Pond received treated wastewater.	• Water would be reduced due to lack of wastewater. • Total water supply reduced by over 90% (avg. year)	• Some change in vegetation to upland species. A gradual process.	-10%
B-5	• Pond received stormwater runoff. • Pond received treated wastewater.	• Water would be reduced due to lack of wastewater. • Total water supply reduced by over 90% (avg. year)	• Vegetation would revert to upland community.	-30%

Although the water supplies for Ponds A-3, A-4 and B-4 would all be reduced, the average pond levels for these ponds would only be reduced slightly. In the North Walnut Creek drainage, there is still a predicted surplus volume in an average year, so the filling and discharge cycles of Ponds A-3 and A-4 would be less frequent, but the average pond levels would remain somewhat similar compared to the current configuration. For Pond B-4, though the volume flowing through the pond would be diminished, there would be baseflow to sustain it as a shallow, flow-through pond, based on the SWWB model results (K-H, 2002b). Some shift in the vegetation of these ponds toward upland species may occur, but would be a much more gradual process. The potential for invasion by upland weeds is less with these ponds compared with ponds where the water supply would be more significantly diminished. Therefore, the wetland functions of Ponds A-3, A-4 and B-4 would not be changed significantly.

Note that the extent of water depletion has been approximated in the EA to develop a baseline configuration for determining impacts to A and B series pond modification actions. Impacts associated with water depletion are outside the scope of the EA.

Other Non-CERCLA Actions

Additionally, the area along the Central Avenue Ditch and the location where the culverts run beneath the old Perimeter Intrusion Detection Assessment System (PIDAS) are highly disturbed locations. The Central Avenue Ditch runs along Central Avenue and is surrounded largely by parking lots, roads, the 903 pad area, and low quality reclaimed grassland. The location where the culvert goes beneath the old PIDAS is dominated by the large gravel areas of the PIDAS, roads, buildings, and some low quality reclaimed grassland. These areas have little natural vegetation present and provide little wildlife value. A small area of jurisdictional wetlands occurs east and west of where the culvert passes beneath the old PIDAS. The wetlands occur along South Walnut Creek in a highly channelized section of the IA. A portion of these wetlands may be disturbed during the culvert removal and stream channel restoration activities.

4.1.3 Threatened and Endangered Vegetative Species

The following table presents threatened or endangered species of plants that may occur in the vicinity of RFETS. This table is based on a species list received from the USFWS (USFWS, 2003).

Table 4-3. Threatened and Endangered Vegetative Species

Plants	Legal Status
Colorado butterfly plant (*Gaura neomexicana coloradensis*)	T
Ute ladies'-tresses orchid (*Spiranthes diluvialis*)	T

T = Listed threatened

Ute ladies'-tresses orchid and Colorado butterfly plant are both listed species but have not been documented on the Site (ESCO, 1993; ESCO, 1994; DOE, 1996a), including the project area.

4.1.4 Wildlife

Wildlife use in North and South Walnut Creek as well as Woman Creek is comparable to that documented elsewhere in the riparian and grassland areas at the Site (K-H, 1998; K-H, 1999; K-H, 2000; K-H 2001; K-H 2002a). A considerable diversity of wildlife occurs at the Site. As the focus of the project work would be on the stream bottoms and ponds, wildlife that is associated with those types of habitats and vegetation communities (e.g., riparian woodland/shrubland, wetlands, mesic mixed grassland, mixed grassland) would be more prevalent there. A brief discussion follows of the various groups of wildlife found at the Site.

Mule deer (*Odocoileus hemionus*) are common across the Site with an occasional white-tailed deer (*O. virginianus*) mixed in the population. Deer population numbers range between 100 and 160 on an annual basis at the Site. In recent years, elk (*Cervus elaphus*) and black bear (*Ursus americanus*) have been observed occasionally in the Buffer Zone at the Site. The most commonly observed carnivore is the coyote (*Canis latrans*). Several active coyote dens are present at the Site each year. Mid to small sized animals include desert cottontails (*Sylvilagus audubonii*), white-tailed (*Lepus townsendii*) and black-tailed (*Lepus californicus*) jackrabbits, raccoons (*Procyon lotor*), muskrats (*Ondatra zibethicus*), and black-tailed prairie dogs (*Cynomys ludovicianus*). Common small mammals include deer mice (*Peromyscus maniculatus*), prairie (*Microtus ochrogaster*) and meadow voles (*M. pennsylvanicus*), harvest mice (*Reithrodontomys sp*.), and shrews (*Sorex sp*.). The Preble's mouse, a federally listed threatened species, also occurs at the Site and in the project area. It is discussed further below.

Amphibians and reptiles can be observed across the Site in the appropriate habitats for each species. Common species include the prairie rattlesnake (*Crotalus viridis*), boreal chorus frogs (*Pseudacris triseriatus maculata*), northern leopard frogs (*Rana pipiens*), western painted turtles (*Chrysemys picta*), and bullfrogs (*Rana catesbeiana*). Occasionally the eastern short-horned lizard (*Phynosoma douglassi*) can be observed on the xeric tallgrass prairie. Fish can be found in the intermittent streams and most ponds at the Site. Common species include fathead minnows (*Pimephales promelas*), creek chubs (*Semotilus atromaculatus*), and an occasional small-mouth (*Micropterus dolomieui*) and large-mouth (*M. salmoides*) bass.

Currently the IA supports wildlife typical of disturbed urban settings. Bird species such as house sparrow (*Passer domesticus*), house finches (*Carpodacus mexicanus*), starlings (*Sturnus vulgaris*), pigeons (*Columba livia*), and barn (*Hirundo rustica*) and cliff swallows (*Petrochelidon pyrrhonota*) are predominant. Mammals include house mice (*Mus musculus*), raccoons, a few deer that wander among the buildings, and the occasional feral cat (*Felis domesticus*). No threatened, endangered, or candidate species of plants or animals occur in the IA. Although at a couple of locations, the current Preble's mouse protection areas cross slightly into the IA, these areas are already largely disturbed, consisting of roads, buildings, and parking areas. Additionally at these areas the North Access Road with its culverts and high berm stature provide effective barriers to Preble's mouse movement into the IA.

4.1.5 Migratory Birds

Birds occur in all available habitats at the Site. Song birds such as meadow larks (*Sturnella neglecta*) and vesper sparrows (*Pooecetes gramineus*) are common in the grassland areas of the Site (including the project areas). These birds and other animals living in the grassland areas provide forage for raptors such as red tailed hawks (*Buteo jamaicensis*), swainson's hawks (*Buteo swainsoni*), northern harriers (*Circus cyaneus*), great horned owls (*Bubo virginianus*), and American kestrels (*Falco sparverius*). All but the swainson's hawk are common year-round at the Site. In summer, the most common additional species are Swainson's hawks, golden eagles (*Aquila chrysaetos*), and turkey vultures (*Cathartes aura*). Other raptors that occasionally visit the Site include the golden eagle, peregrine falcon (*Falco peregrinus*), ferruginous hawk (*Buteo regalis*), and burrowing owl (*Athene cunicularia*).

The riparian areas along the streams and drainage bottoms on Site support a variety of song and neo-tropical migrant species of birds. Over 95 neo-tropical migrant species have been recorded at the Site. Some of these include American goldfinch (*Carduelis tristis*), Lesser goldfinch (*Carduelis psaltria*), Bullock's orioles (*Icterus bullockii*), Brewer's blackbirds (*Euphagus cyanocephalus*), yellow warblers (*Dendroica petechia*), western kingbirds (*Tyrannus verticalis*), common nighthawks (*Chordeiles* minor), and Cooper's hawks (*Accipiter cooperii*). Other common neo-tropical birds include the Say's phoebe (*Sayornis saya*), eastern kingbirds (*Tyrannus tyrannus*), cliff and barn swallows, American robins (*Turdus migratorius*), yellow warblers (*Dendroica* spp.), common yellowthroat (*Geothlypis trichas*), grasshopper sparrows (*Ammodramus savannarum*), and red-winged blackbirds (*Agelaius phoeniceus*). Raptors such as red-tailed hawks and great horned owls occasionally use the riparian woodlands for perches or nesting areas.

The ponds located in the project areas are utilized by waterfowl and shorebirds as breeding habitat or feeding areas. Among more than 45 species of waterfowl and shorebirds at the Site, mallards (*Anas platyrhynchos*), Canada geese (*Branta canadensis*), and great blue herons (*Ardea herodias*), are the most common. Other frequently observed waterfowl species include buffleheads (*Bucephala albeola*), blue-winged teal (*Anas discors*), green-winged teal (*Anas crecca*), common (*Mergus merganser*) and hooded mergansers (*Lophodytes cucullatus*), ring-necked ducks (*Aythya collaris*), redheads (*Aythya americana*), and lesser scaups (*Aythya affinis*), black-crowned night herons (*Nycticorax nycticorax*), double crested cormorants (*Phalacrocorax auritus*), American coots (*Fulica americana*), and pie-billed grebes (*Podilymbus podiceps*). As water flow in the project area is reduced, the value of the ponds as waterfowl and shorebird habitat would be somewhat reduced, so that the environmental baseline for the proposed action would reflect less utilization of the ponds than has been observed historically.

4.1.6 Threatened and Endangered Wildlife Species

Based on a species list received from the USFWS (USFWS, 2003), the following species must be evaluated for potential impacts by projects at the Site.

Table 4-4. Threatened and Endangered Wildlife Species

Animals	Status
Bald eagle (*Haliaeetus leucocephalus*)	T
Canada lynx (*Lynx canadensis*)	T
Greenback cutthroat trout (*Oncorhynchus clarki stomias*)	T
Interior Least tern (*Sterna antillarum*)*	E
Mexican spotted owl (*Strix occidentalis lucida*)	T
Pallid sturgeon (*Scaphirhynchus albus*)*	E
Pawnee montane skipper (*Hesperia leonardus montana*)	T
Piping plover (*Charadrius melodus*)*	T
Preble's meadow jumping mouse (*Zapus hudsonius preblei*)	T
Whooping crane (*Grus americana*)*	E

* = Lower Platte River species
T = Listed threatened
E = Listed endangered

Of these species, only the Preble's mouse occurs at the Site. Bald eagles are occasionally observed flying over the Site, perhaps hunting for prey, but do not nest or roost at the Site. The Preble's mouse has been documented and studied extensively in each of the main drainages at RFETS. Studies at the Site have focused on trapping and tagging Preble's mice, and tracking their movements through the use of telemetry. In addition, habitat characterization has been done to quantify habitat parameters for the mouse at the Site. The data from these studies have yielded information on Preble's mouse habitat, areas of occupation, home ranges, and mouse movement at the Site. Preble's mice have been captured in both North and South Walnut Creek and the Woman Creek drainages. At the Site, the Preble's mouse habitat generally occurs along the stream channels in areas where multi-strata vegetation exists to provide food, shelter, and cover for the mouse. No critical habitat was designated at the Site by USFWS in their final ruling on critical habitat for the Preble's mouse because the Site will become the Rocky Flats National Wildlife Refuge after closure (68 FR 37275).

4.1.7 Candidate Species

A candidate species is one that is proposed to be listed under the Endangered Species Act. The Endangered Species Consultation Handbook (USFWS, 1998) defines "candidate species" as: "plant and animal taxa considered for possible addition to the List of Endangered and Threatened Species." Two candidate species are listed by the USFWS as having the potential to occur on or in the vicinity of the Site.

Table 4-5. Candidate Species

Animals	Legal Status
Black-tailed prairie dog (*Cynomys ludovicianus*)	C
Boreal toad (*Bufo boreas boreas*)	C

C = Listed candidate species

The black-tailed prairie dog is found at several locations on Site. One colony exists on the north side of the North Buffer Zone along Highway 128. Several smaller colonies are located in the South Buffer Zone, east and south of the C-2 pond. The boreal toad is a mountain species and does not exist on nor has been seen in the vicinity of the Site. The locations of candidate species at the Site are not within areas impacted by the actions proposed in the EA.

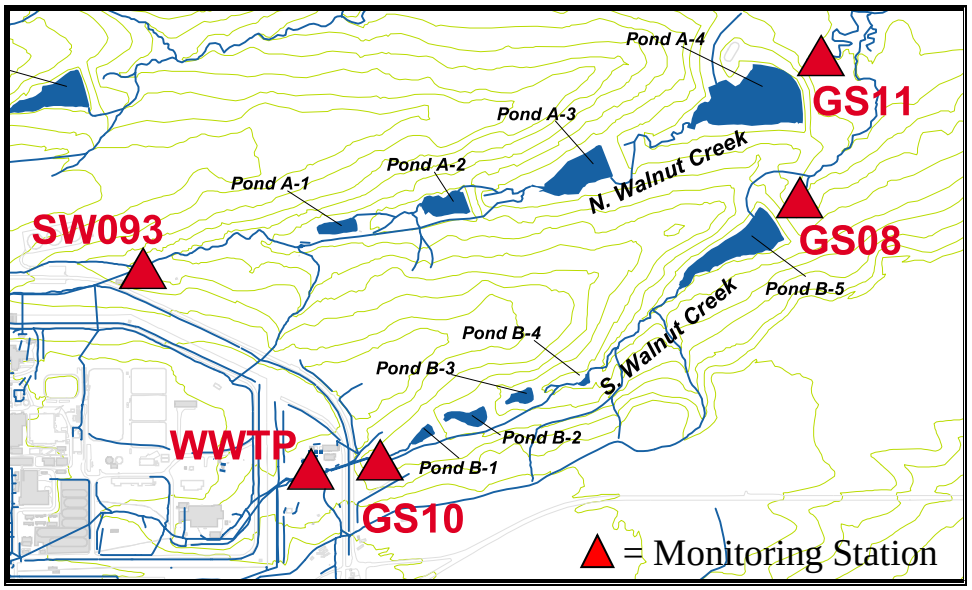
4.2 Physical Resources

Physical resources include several aspects of water, air, archeological significance, and noise. In Section 4.2.1, water resources are evaluated in terms of quantity (determined from baseflow, wastewater treatment discharges, total water volume, 100-year storm event flows, and pond levels) and quality (as measured and predicted at the monitoring locations on North and South Walnut Creek). Air, archeological significance, and noise are discussed in Sections 4.2.2, 4.2.3, and 4.2.4.

4.2.1 Water Resources

To define the "baseline" configuration for the EA, water resources are discussed in terms of the water quantity and quality that are anticipated to exist after the RFETS closure is complete. Water quantity is addressed in Section 4.2.1.1 and water quality is addressed in Section 4.2.1.2. Property interests in water resources may need to be evaluated to the extent that acquisition or adjudication of water rights becomes necessary. For reference, existing Point of Compliance (POC) and Point of Evaluation (POE) surface water monitoring stations in the North and South Walnut Creek ponds study area are shown in Figure 4-2.

Figure 4-2. Surface Water POC and POE Monitoring Stations in A and B Series Ponds



4.2.1.1 Water Quantity

As noted earlier, three major changes would occur as a result of RFETS closure activities that would have major impacts on the EA "baseline" hydrology of the Walnut Creek A and B Series ponds. These changes are:

- Elimination of all discharges from the RFETS WWTP;
- Reduction in the amount of stormwater flow from the IA; and
- Elimination of imported water for sediment wetting.

To predict how the hydrology of RFETS would differ in the future, a computer model was developed using the MIKE SHE code to assess changes to both surface water and groundwater. These results are presented in the SWWB Model Report for RFETS (K-H, 2002b). The MIKE SHE code integrates surface water and groundwater flow, and incorporates processes such as evaporation and evapotranspiration (K-H, 2002b). It is noted that the SWWB results for the future IA configuration are based on plans for the final IA configuration that vary somewhat from the current plans for the same area. Nevertheless, the future Site configuration used for the SWWB does incorporate key factors of the changing water balance at the Site, including: 1) elimination of WWTP discharges to South Walnut Creek, and 2) removal of IA buildings and pavement. In addition, other changes to the IA are incorporated into the model, such as deactivation of footing drains post-closure, which has an impact on groundwater levels and seeps. Therefore, the SWWB provides a realistic general basis for projecting future ecological conditions resulting from these flow reductions.

The SWWB model predictions for the future Site hydrology were developed for the WY2000 precipitation record (October 1, 1999 through September 30, 2000), as well as a "wet" year and a "dry" year. WY2000 had a total precipitation depth of 13.8 inches, compared to the mean annual precipitation depth of 14.8 inches based on 35 years of Site record (K-H, 2002b). The wet year and dry year were based on the mean precipitation depth of 100 years of Ft. Collins, Colorado precipitation record, since it had the best match to RFETS precipitation (compared with Golden, Boulder, and Denver [Stapleton] records), and had a longer period of record than the Site. "Wet" and "dry" year model simulations were run using the mean of the Ft. Collins precipitation depth (15.2 inches) plus or minus one standard deviation (4.2 inches), or 19.4 inches and 11 inches for the wet and dry years, respectively.

The discussion of the EA "baseline" hydrology addresses baseflow, WWTP flows, total water volume in North and South Walnut Creeks, storm flows, and predicted average future pond levels.

Baseflow

A comparison of current average baseflow versus predicted baseflow for "baseline" conditions, based on SWWB model predictions for WY2000, was

generated (K-H, 2002b). At monitoring station location SW093 (located upstream from Pond A-1 in North Walnut Creek) baseflow is predicted to decrease by more than approximately 30 percent (to 0.06 cfs), and at monitoring station location GS10 (located upstream from Pond B-1 in South Walnut Creek) baseflow is predicted to decrease by more than approximately 70 percent (to 0.01 cfs).

Wastewater Treatment Plant Discharges

The treated effluent from the RFETS WWTP is currently discharged into Pond B-3 in South Walnut Creek. WWTP discharges are scheduled to be eliminated in 2004, when the facility is decommissioned. The WWTP discharges and runoff from the IA (through GS10) comprise essentially all of the inflow to the South Walnut Creek ponds. WWTP discharges have historically comprised approximately 64 percent of the total combined WWTP and GS10 water volume, based on flow records collected from WY 1993 through WY 2003 (K-H, 2003b). Therefore, since the EA baseline configuration is based on elimination of WWTP discharges, the EA baseline configuration would have significantly reduced flows in South Walnut Creek compared to the current configuration, based only on the changes planned for the WWTP.

Total Water Volume

The total inflow volumes for North and South Walnut Creeks for the current configuration are compared to the predicted inflow volumes in the EA baseline configuration for various climate scenarios (see Table 4-6). The current configuration inflow volumes are based on WY2000 data measured at Site gaging stations, and the EA baseline configuration data are from SWWB model predictions using for WY2000, wet year, and dry year climates. The total volumes represent a combination of baseflows and stormwater runoff. In addition, the total inflow volume measured for South Walnut Creek, in the current configuration *only*, includes the WWTP discharges. Compared to the current configuration, North Walnut Creek flows are reduced in the EA baseline because of decreased runoff from the IA. South Walnut Creek flows are reduced because of decreased runoff from the IA as well as discontinued discharges from the WWTP.

Table 4-6. Comparison of Total Inflow Volumes – Current Site Configuration Versus Predictions for Future Baseline Configuration

Drainage (Station[s])	Annual Volumes			Percent Change (future configuration compared to avg. current flows)
	Current Configuration Measured Avg. Volume[1] (ac-ft)	Future Configuration Model Climate Simulation[2]	Future Configuration Model Predicted Volume[2] (ac-ft)	
North Walnut Creek (SW093)	132.8	WY2000 (~1 in. below average precipitation depth)[3]	44.7	-69%
		Dry Year[4]	30.9	-78%
		Wet Year[5]	92.1	-36%
South Walnut Creek (GS10+WWTP)	286.1	WY2000 (~1 in. below average precipitation depth)[3]	8.1	-97%
		Dry Year[4]	5.7	-98%
		Wet Year[5]	20.3	-93%

Notes:
[1]Current configuration volume based on measured gage data:
WY1994 – WY2003 for SW093, WY1993 – WY2003 for GS10 and WWTP.
[2]Future configuration volumes based on model results (K-H, 2002b).
[3]WY2000 precipitation depth = 13.8 inches, compared to RFETS average annual depth of 14.8 inches.
[4]Dry Year simulation based on 11 inches annual precip depth (Ft. Collins record mean depth – 1 std. deviation).
[5]Wet Year simulation based on 19.4 inches annual precip depth (Ft. Collins record mean depth + 1 std. deviation).

To depict predicted seasonal trends in inflows to the ponds for the EA baseline configuration, model simulated flows at sampling locations SW093 and GS10 are presented for WY2000 in Figure 4-3 and Figure 4-4, respectively (K-H, 2002b). Both plots demonstrate that the inflows to the ponds are predicted to remain fairly constant over the course of the year, sustained primarily by relatively continuous baseflow in each of the drainages, but with some increased seasonal runoff from winter snowmelt and spring precipitation. The plots are presented in the same scale to demonstrate the difference in predicted flows between North Walnut Creek (Figure 4-3) and South Walnut Creek (Figure 4-4).

Figure 4-3. North Walnut Creek - Model-Predicted Volumes at SW093 by Month in EA Baseline Configuration (WY2000 Climate)

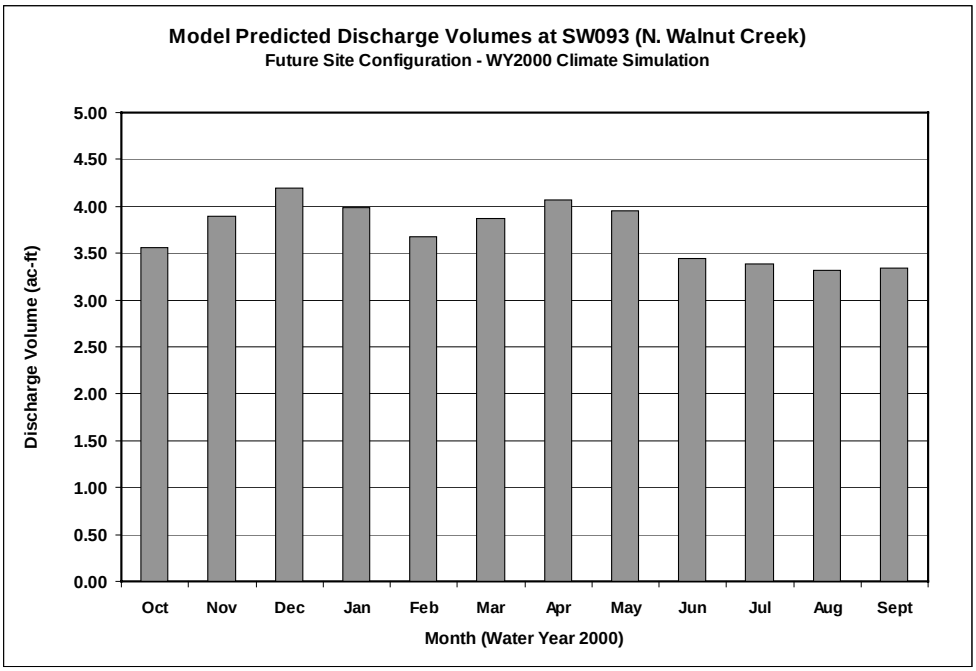
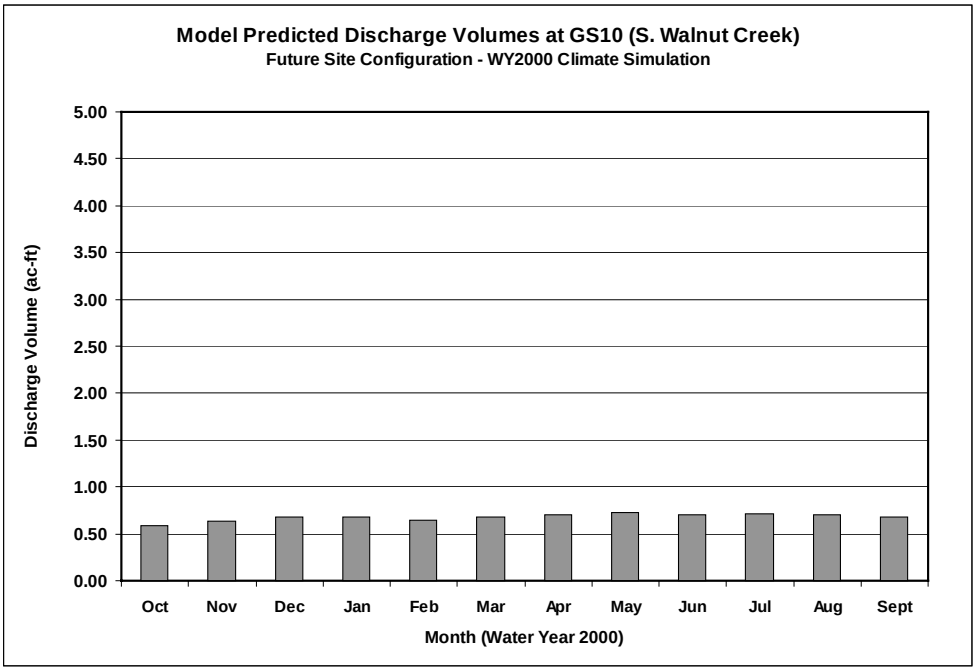


Figure 4-4. South Walnut Creek - Model-Predicted Volumes at GS10 by Month in EA Baseline Configuration (WY2000 Climate)



100-Year Storm Event Flows

Model simulations were performed to assess how changes to the Site would impact the runoff generated from a 100-year, 6-hour storm event (3.8 inches of precipitation [EG&G, 1992]) for the current Site configuration compared with the future EA baseline configuration (K-H, 2003a). Model prediction results for the estimated discharge volumes for the 100-year, 6-hour storm for these two Site configurations are summarized in Table 4-7 (K-H, 2003a). Model predicted peak discharge rates for the 100-year, 6-hour storm for these two configurations are summarized in Table 4-8. This information is provided to support the analysis of impacts to floodplains required by 10 CFR 1022 (CFRb).

Table 4-7. 100-Year, 6-Hour Storm Event Predicted Discharge Volumes – Current Configuration Compared to EA Baseline Configuration

Drainage (Station)	Predicted Discharge Volume 100-year, 6-hour storm		Percent Change (Future configuration compared to current)
	Current Configuration (ac-ft)(approx.)	Future (Baseline) Configuration (ac-ft)(approx.)	
North Walnut Creek (SW093)	50	35	- 30%
South Walnut Creek (GS10)	45	20	- 56%

Table 4-8. 100-Year, 6-Hour Storm Event Predicted Peak Discharge Rate – Current Configuration Compared to EA Baseline Configuration

Drainage (Station)	Predicted Peak Discharge Rate 100-year, 6-hour storm		Percent Change (Future configuration compared to current)
	Current Configuration (cfs)(approx.)	Future (Baseline) Configuration (cfs)(approx.)	
North Walnut Creek (SW093)	440	280	- 36%
South Walnut Creek (GS10)	345	125	- 64%

Pond Levels

Average pool elevations were predicted for the North and South Walnut Creek ponds using the SWWB model for the EA baseline configuration, based on the

WY2000 climate. The predicted EA baseline average annual pool elevations are compared with the average measured elevations for the current Site configuration, based on data collected from 1991 through 2003 (see Table 4-9). It is noted that the relative elevation change for Pond A-3, from the current configuration to the EA baseline configuration, is predicted to actually go up approximately 0.2 feet. This is an artifact of averaging the Pond A-3 pool levels over multiple filling and discharge cycles over the course of a year. For the EA baseline configuration using the WY2000 climate, Pond A-3 is projected to fill and empty three times in one year. This compares to the current Site configuration, where Pond A-3 actually filled and discharged eight times during WY2000. Therefore, for the EA baseline configuration, it is fair to assume that the average Pond A-3 pool elevation, over one year, would remain at a level similar to the current Site configuration, but it would fill and discharge less frequently. It should be noted that North Walnut Creek drainage volumes would remain such that filling and discharging activities are still required for Ponds A-3 and A-4.

Table 4-9. Pond Average Annual Pool Elevations – Current Configuration Compared with Predicted Levels in EA Baseline Configuration for WY2000

Pond	Current Configuration Elevation Normal Water Level[1] (Ft-AMSL)	EA Baseline Configuration Elevation Normal Water Level[1] (Ft-AMSL)	Elevation Change (ft)
A-1	5,824.2	5,822.2	- 2.2
A-2	5,809.6	5,808.9	- 0.7
A-3	5,785.2	5,785.4	+ 0.2
A-4	5,746.9	5,746.5	- 0.4
B-1	5,877.5	5,876.0	- 1.5
B-2	5,865.0	5,863.0	- 2.0
B-3	5,848.5	5,846.6	- 1.9
B-4	5,834.0	5,833.8	- 0.2
B-5	5,792.1	5,787.7	- 4.4

Note: The Pond A-3 predicted increased pool elevation is an artifact of multiple filling and discharge cycles. For practical purposes, the average A-3 pool level can be assumed to be the same, recognizing that the number of filling cycles is predicted to be reduced more than half.

4.2.1.2 Water Quality

SW093 (North Walnut Creek)

Station SW093 on North Walnut Creek is a RFCA POE monitoring location. Surface water sample results at sampling location SW093 from WY1997 through WY2002, for radionuclides, are summarized in Table 4-10. Although the maximum results for Pu-239/240 and Am-241 are both above the RFCA Action Levels (0.15 pCi/L for each), only Pu has been measured above 0.15 pCi/L for a 30-day moving average. For Uranium, every sample from WY1997 through WY2002 was below the 10 pCi/L Action Level for Walnut Creek.

Table 4-10. Summary Statistics of Radionuclide Analytical Results at SW093 (WY1997 – WY2002)

Radionuclide	Samples (N)	Median (pCi/L)	85th Percentile (pCi/L)	Maximum (pCi/L)	RFCA Action Level (pCi/L)[1]
Pu-239/240	207	0.007	0.038	1.060	0.15
Am-241	205	0.008	0.033	0.628	0.15
U (total)	207	2.690	4.200	6.640	10

Note:
[1]Pu-239/240 and Am-241 Action Level is 0.15 pCi/L based on a 30-day, flow-weighted moving average. The total U RFCA Action Level is 10 pCi/L in Walnut Creek.

Results for metals analyses at SW093, also from WY1997 through WY2002, are summarized in Table 4-11. Although a single result for a metal at monitoring station location SW093 (for cadmium) has been above its Action Level, there has not been a 30-day moving average above its respective Action Level for a metal measured at SW093 from WY1997 to WY2002.

Table 4-11. Summary Statistics of POE Metals Analytical Results at SW093 (WY1997 – WY2002)

Analyte	Samples [N]	Percent Undetect	Median [µg/L]	85th Percentile [µg/L]	Maximum [µg/L]	RFCA Action Level [µg/L]
Total Be	206	43.7%	0.11	0.50	2.10	4
Dissolved Cd	199	65.8%	0.05	0.15	2.20	1.5
Total Cr	205	24.4%	1.60	4.80	34.9	50
Dissolved Ag	196	88.3%	0.10	0.18	1.00	0.6

EA Baseline Water Quality at SW093

The quality of surface water entering the North Walnut Creek ponds at monitoring station SW093 in the EA baseline configuration is expected to be of generally comparable quality, or possibly improved quality, compared to the water flowing at SW093 in the current Site configuration. As impervious surfaces in the IA would be removed and peak flow rates of storm events would be reduced, erosion processes associated with the runoff should also be reduced. The lowered erosion rates should reduce the potential for residual contaminants in the surface soil to be mobilized. In addition, exposed soil surfaces in the IA would be revegetated as part of the Site closure, thereby further reducing the amount of soil susceptible to erosion. In all cases, the total contaminant loads transported at SW093, compared to present loads, should be reduced, as a function of the reduced water volume in the EA baseline configuration.

GS11 (North Walnut Creek below Pond A-4)

Monitoring station GS11 on North Walnut Creek, at the outfall of Pond A-4, is a RFCA POC monitoring location. Pu and Am have continuously been measured at levels (at GS11) that are compliant with the 30-day moving average RFCA standard of 0.15 pCi/L, since RFCA monitoring was initiated in October 1996. Similarly, the total uranium observed at GS11 has also been in continuous compliance with the RFCA standard of 10 pCi/L. These data are periodic, as 30-day moving averages at GS11 are only calculated for those days when Pond A-4 is being discharged and there is flow.

EA Baseline Water Quality at GS11 (North Walnut Creek Below Pond A-4)

Similar to monitoring station SW093, the quality of surface water discharged to monitoring station GS11 from Pond A-4 in the EA baseline configuration is expected to be of generally comparable, or possibly improved quality, compared to the water discharged from A-4 in the current Site configuration. Again, peak flow rates of storm events would be reduced because of the IA impervious surfaces being eliminated. Therefore, erosion processes should be reduced as well.

In addition to inflow water quality that would be potentially improved, the residence time of particles in Pond A-4 would be longer than in the current Site configuration. For the WY2000 model simulation, it is projected that Pond A-4 would be discharged one time during the year. This compares with the current configuration, where Pond A-4 was actually discharged twice in WY2000. The increased residence time should allow for increased particle settling and removal of low solubility contaminants such as Pu and Am.

GS10 (South Walnut Creek)

Monitoring station GS10 on South Walnut Creek is a RFCA POE monitoring location. Surface water sample results at GS10 from WY1997 through WY2002,

for radionuclides, are summarized in Table 4-12. Although the median results for Pu-239/240 Am-241 at GS10 are below their RFCA Action Levels (0.15 pCi/L for each), both Pu and Am have been periodically measured above 0.15 pCi/L for a 30-day moving average.

Table 4-12. Summary Statistics of Radionuclide Analytical Results at GS10 (WY1997 – WY2002)

Radionuclide	Samples (N)	Median (pCi/L)	85th Percentile (pCi/L)	Maximum (pCi/L)	RFCA Action Level (pCi/L)[1]
Pu-239/240	189	0.047	0.187	2.270	0.15
Am-241	186	0.054	0.163	8.385	0.15
U (total)	189	3.023	4.320	6.480	10

Results for metals analyses at GS10, also for WY1997 through WY2002, are summarized in Table 4-13. Though a result for silver was above the RFCA Action Level during that time period, there has not been a 30-day moving average at GS10 for a metal above its respective Action Level.

Table 4-13. Summary Statistics of POE Metals Analytical Results at GS10 (WY1997 – WY2002)

Analyte	Samples [N]	Percent Undetect	Median [µg/L]	85th Percentile [µg/L]	Maximum [µg/L]	RFCA Action Level [µg/L]
Total Be	186	40.3%	0.12	0.56	2.50	4
Dissolved Cd	177	50.3%	0.08	0.17	0.62	1.5
Total Cr	187	20.3%	2.05	5.80	23.20	50
Dissolved Ag	177	87.6%	0.11	0.18	1.10	0.6

EA Baseline Water Quality at GS10 (South Walnut Creek)

Similar to North Walnut Creek, the quality of surface water running off to the South Walnut Creek ponds at station GS10, in the EA baseline configuration, is expected to be of generally comparable quality, or possibly improved quality, compared to the water flowing at GS10 in the current Site configuration. The GS10 watershed is currently composed of approximately 50 percent impervious surfaces. Elimination of these surfaces, as well as revegetation of exposed soil, would cause a significant reduction in peak flow rates and total runoff volume from storm events, as well as erosion. The lowered erosion rates should reduce the potential for residual contaminants in the surface soil to be mobilized,

specifically Pu and Am, the contaminants that historically have been measured at GS10 in reportable concentrations. The total contaminant loads transported at GS10, compared to present loads, should be significantly reduced, as a function of the reduced water volume in the EA baseline configuration.

GS08 (South Walnut Creek Below Pond B-5)

Monitoring station GS08 on South Walnut Creek, at the outfall of Pond B-5, is a RFCA POC monitoring location. Pu and Am have continuously been measured at levels at monitoring location GS08 that are compliant with the 30-day moving average RFCA standard of 0.15 pCi/L, since RFCA monitoring was initiated in October 1996. Measured Pu and Am activity has, however, been observed at higher levels than measured at station GS11 (Pond A-4 discharges), but below the 0.15 pCi/L standard for 30-day moving averages. Similarly, the total Uranium observed at GS08 has also been in continuous compliance with the RFCA standard of 10 pCi/L. These data are periodic, as 30-day moving averages at GS08 are only calculated for those days when Pond B-5 is being discharged and there is flow.

EA Baseline Water Quality at GS08 (South Walnut Creek Below Pond B-5)

In the existing Site configuration, water quality in Pond B-5 generally benefits from the WWTP treated effluent discharged into South Walnut Creek. The WWTP flow typically comprises over half the water volume discharged annually from the drainage. Therefore, the discontinuation of WWTP discharges, in itself, would have a potential impact on the water quality that would exist in the EA baseline configuration. However, as noted for monitoring station GS10, upstream from Pond B-5, the reduced impervious surfaces and increased vegetation in the IA would result in less runoff and reduced soil erosion.

The total loads of contaminants discharged from Pond B-5 would be reduced, as total flow volumes in South Walnut Creek are predicted to be diminished by more than 90 percent compared to the existing condition (see Table 4-6). As noted for Pond A-4, the particle residence time in Pond B-5 would be extended significantly for the EA baseline configuration. Pond B-5 is not projected to require a discharge even during a wet year climate simulation. Therefore, it may require several years, or several relatively large storm events, to force Pond B-5 to be discharged. The extended particle residence time should promote additional settling of contaminants bound to particles suspended in surface water.

4.2.2 Air Quality

Air quality is a measure of the amount and distribution of potentially harmful pollutants in the ambient air. Ambient air quality in a given location is characterized by comparing the concentrations of various pollutants in the atmosphere to standards set by federal and state environmental agencies. National Ambient Air Quality Standards have been established by the EPA for seven pollutants, known as “criteria pollutants”. They are

carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter 10 micron in diameter and smaller (PM_{10}), particulate matter 2.5 microns in diameter and smaller ($PM_{2.5}$), and lead (Pb). The purpose of these "health" standards is to allow an adequate margin of safety for the protection of public health and welfare from the adverse effects of ambient air pollution. A geographic area that exceeds a health standard for one or more of the criteria pollutants is called a nonattainment area. Areas where the concentrations of criteria pollutants are below the established standards are called attainment areas.

RFETS is located within the boundary of the Denver Metropolitan Area for air quality planning purposes and is currently designated as an attainment area for all of the criteria air pollutants. In addition, CDPHE operated an ambient air monitoring network around the perimeter of the Site from July 1992 through June 2001. Results from this monitoring network show that concentrations of pollutants that might originate from the Site are below those in other portions of the Denver metropolitan area, and are typical of concentrations found on the edges of the Denver area (concentration levels for PM_{10}, which is the main air pollutant of concern for the projects covered by the EA, were less than half of the National Ambient Air Quality Standard). The concentration levels have not changed during Site demolition and environmental remediation activities, so the monitoring network was shut down in June 2001. These conclusions hold true for the baseline conditions assumed in the EA.

The Site is also subject to *National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities* (Title 40 of the Code of Federal Regulations [CFR], Part 61, Subpart H). The standard requires that emissions of radionuclides to the ambient air from the Site not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent (EDE) of 10 millirem (mrem). The Site demonstrates compliance with the 10 mrem/year standard through environmental measurements obtained from a network of 14 high-volume, size-fractionating ambient air samplers at the perimeter of the Site. The maximum dose recorded at the compliance sampling network for the past five years has been nearly two orders of magnitude below the 10 mrem/year standard (CDPHE, 2001).

4.2.3 Archaeological Significance

The Site includes important historic and cultural resources that have been identified through systematic surveys conducted by DOE. Two systematic archaeological surveys have been conducted in the project areas where the work covered by the EA would occur (Burney, 1989; DOE, 1995; DOE, 1996b). While numerous prehistoric and historic sites were identified within the Buffer Zone, no resources were found in the immediate project area.

4.2.4 Noise

No sound level measurements have been made at RFETS to determine background sound levels. Major noise sources have occurred within the IA. Temporary sources of noise in both the IA and the Buffer Zone result from building demolition and environmental restoration and associated activities. These facilities are far enough from the Site boundary

that their noise is barely distinguishable from background noise. Traffic is the primary source of noise at the Site boundary and at nearby residences. RFETS onsite traffic contributes little to overall traffic noise; however, traffic noise from other sources is expected to dominate sound levels along major roads in the area.

4.3 Human Health

Onsite human health issues associated with areas affected by the proposed actions include typical industrial hazards associated with ongoing Site management and closure activities (e.g., pond management, pond and drainage maintenance, environmental monitoring, environmental restoration). Hazards to personnel have been controlled to minimal levels through implementation of the overall RFETS health and safety program and through project- and activity-specific safety plans, where applicable.

With regard to the offsite human health environment potentially affected by the proposed action, surface water in the Walnut Creek drainage is collected and analyzed in the A and B Series ponds prior to being discharged from the Site. These pond management practices have been implemented as part of the RFETS runoff control and pollution prevention programs and have limited potential offsite health impacts from surface water discharges to insignificant levels. As discussed earlier, the baseline condition for the proposed action reflects significantly decreased flow in the ponds as a result of Site closure activities and resulting longer retention periods. Accordingly, the human health baseline for the project reflects an even lower potential for offsite human health effects.

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5.0 ENVIRONMENTAL EFFECTS FOR A AND B SERIES PONDS

This section discusses how the Proposed Action for the A and B series ponds, the Alternative Action, and the No Action Alternative would affect the environment described in Section 4 in terms of biological resources, physical resources, and human health. This section also covers potential cumulative effects, environmental justice issues, and compliance with other regulations. Section 5.7 offers conclusions and a summary table based on the evaluation of these effects.

It is reiterated that the impacts from actions assessed in this section are the projected impacts to the future baseline environment, defined in Section 4. The baseline environment is a future condition of the Site that incorporates the effects of other major activities planned for the Site, such as:

- Decommissioning the WWTP;
- Eliminating imported water to the Site; and
- Eliminating impervious surfaces in the IA (elimination of those surfaces that are addressed in separate NEPA documentation).

The impacts from these other actions are separate from the impacts of the proposed action, and will be analyzed in RFCA decision documents.

5.1 Proposed Action – A and B Series Ponds

5.1.1 Biological Resources

5.1.1.1 Vegetation and Wetlands

Direct impacts to vegetation communities would occur from excavation and filling for embankment modifications, disturbance from construction areas, and hydrologic modification of the ponds. Indirect impacts could occur from weed invasion.

To assess direct impacts, the extent of surface disturbance for the proposed action at each embankment was compared to the baseline vegetation condition. Indirect impacts were assessed by evaluating the likely effects of any proposed change in water level on wetland vegetation in the ponds. As the baseline conditions and proposed action vary for the ponds, an impact analysis was completed for each pond. This analysis is summarized below. Note that due to the need to project a baseline condition to evaluate these actions, areas of impact are approximated as unquantified uncertainties exist.

Pond A-1 (modified interior pond)

The water supply for Pond A-1 would effectively be curtailed post-closure so that, for the baseline EA configuration, this pond would no longer sustain any wetlands. In the baseline configuration, the practice of importing water to keep

the sediments wetted in Pond A-1 would be curtailed, and the stormwater bypass would continue to operate diverting runoff around Pond A-1. Therefore, in the baseline configuration, existing wetland vegetation would gradually be replaced by upland plant species. These changes would be noticed independent of the proposed action. Therefore, the proposed action would not adversely affect any wetlands in this pond. A relatively small area of wetland immediately downstream of the embankment would be permanently impacted by construction of the breach and necessary channel protection. Another small area of wetlands would be temporarily impacted by construction downstream of the embankment.

A minor area of reclaimed mixed grassland vegetation on the existing embankment would be permanently disturbed by the proposed breach (approximately 0.2 acre). An additional acre of reclaimed mixed grassland would be temporarily disturbed by the work. Indirect impacts could occur through weed invasion of disturbed areas.

Pond A-2 (modified interior pond)

The water supply for Pond A-2 would be reduced slightly with Site closure so that there would be a corresponding reduction in pond and wetland area of approximately 10 percent for the baseline configuration. The proposed breach in the embankment would reduce the normal water level of the pond by approximately 6 feet over the baseline condition. This would result in a reduction of approximately an acre of tall marsh wetlands at the pond. Minimal wetlands downstream of the pond would be permanently impacted by construction of the breach in the embankment. Another 0.3 acre of wetlands could be temporarily impacted by construction activities with minimal wetlands losing their water supply from the lowered invert of the breach. Indirect impacts could occur through weed invasion of disturbed areas and the wetlands that would lose its water supply.

Pond A-3 (existing configuration)

No modifications would be made to Pond A-3, as this pond would be maintained in its current condition. There would be no impacts from excavation, fill, or other disturbance. Therefore, there would not be any direct or indirect impacts to vegetation and wetlands at this pond from the proposed action.

Pond A-4 (existing configuration)

No modifications would be made to Pond A-4, as this pond would be maintained in its existing condition. There would be no impacts from excavation, fill, or other disturbance. Little to no vegetated wetlands exist at this pond, likely because of the magnitude of historic water level fluctuations. There would not be any direct or indirect impacts to vegetation or wetlands at this pond from the proposed action.

Pond B-1 (modified interior pond)

The water supply for Pond B-1 would be reduced slightly post-closure and result in a relatively small (20 percent) reduction in wetlands in the pond from the baseline configuration. Minimal temporary impacts to wetlands would result from construction disturbance under the proposed action. Less than an acre of reclaimed mixed grassland could be impacted on a temporary basis from construction. Indirect impacts could occur from invasion of disturbed areas by weeds.

Pond B-2 (modified interior pond)

The water supply for this pond would be reduced post-closure, and this would result, for the baseline configuration, in a reduction in the amount of wetlands over existing conditions. A relatively small amount of short marsh wetland would be temporarily impacted from construction activities. Minimal areas of reclaimed mixed grassland would be permanently impacted, and small areas of short upland shrubland and reclaimed mixed grassland would be temporarily impacted by construction. Indirect impacts could occur from weed invasion of disturbed areas.

Pond B-3 (modified interior pond)

The amount of water for this pond would be reduced significantly post-closure with the cessation of treated WWTP effluent for the baseline configuration. Only a relatively small area of wetlands would remain. Minimal areas of wetland would be impacted temporarily. Minimal areas of reclaimed mixed grassland would be permanently impacted, and small areas of reclaimed mixed grassland and xeric tallgrass prairie would be impacted temporarily. Indirect impacts could occur from invasion of disturbed areas by weeds.

Pond B-4 (modified interior pond)

The water supply for this pond would be reduced significantly post-closure, with reduced IA runoff and termination of flows from the WWTP. Minimal areas of riparian woodland downstream of the embankment would be temporarily impacted by construction. Minimal areas of reclaimed mixed grassland would be permanently impacted, and small areas of upland grassland and upland shrubland would be temporarily impacted. Indirect impacts could result from invasion of disturbed areas by weeds.

Pond B-5 (existing configuration)

No modifications would be made to Pond B-5 under the proposed action. This pond would be maintained in its current condition. The amount of water reaching the pond would be reduced post-closure with the cessation of treated wastewater and diminished stormwater flows. However, the reduced flows would occur regardless of any plans for pond modifications. Therefore, there would not be any

direct or indirect impact to vegetation and wetlands at this pond from the proposed action.

In total, approximately 1.75 acres of wetlands would be permanently and/or temporarily impacted by the proposed action. Most of this impact is to marsh wetlands. A total of approximately 5 acres of upland vegetation would be permanently and/or temporarily impacted. Most of this impact is to reclaimed mixed grassland (i.e., previously disturbed areas that have been revegetated). The permanent wetland impacts represent roughly 20 percent of the post-closure baseline wetlands within the immediate project area, and roughly 1 percent of the total Site wetlands currently in existence. This impact should not significantly affect the functions performed by the remaining wetlands and ponds. Additionally, the potential exists to create a more diverse wetlands community with the creation of rush/sedge wetlands instead of cattail wetlands, which would be beneficial to the Site.

5.1.1.2 Wildlife

The proposed action would have little long-term or short-term impact on most wildlife species in the area. Most mammalian species that utilize the project area are not restricted to any one type of vegetation community, and these animals would be able to move either upslope, or up or down stream from the project area during project activities. Large mammals such as mule deer and coyotes would simply relocate during project activities, but would return to utilize the areas after project completion. Other large mammal species like elk, bears, and white tailed deer are uncommon in the project areas, and would not be directly or indirectly effected by proposed project activities. Small mammals that utilize the project areas may be temporarily effected by project activities. Once project activities conclude and the areas are revegetated, these mammalian species would return to utilize the project areas.

Very few trees are located in and in the vicinity of the dams in Walnut Creek. Therefore, raptor activity in this area is normally limited to foraging. Raptor nesting has not been documented near the dams. Therefore, project activities would have limited, and only temporary, effects on any raptors that do utilize the project areas in Walnut Creek. Raptors may avoid these areas during project activities, but would return after project completion. Marshland and waterfowl bird species that use the cattails and small ponds as nesting areas, such as the red-winged blackbird and the mallard, may be temporarily affected by project activities. However, after project completion these species would be able to use these areas again, after the vegetation has reestablished. They would be able to utilize other ponds (in other drainages) on Site during the duration of the project. Some impacts to herpetile species such as frogs, toads, and turtles may occur depending on the time of year the activities are conducted and whether or not the aquatic habitats have to be drained for construction activities. Aquatic species would be affected temporarily during construction activities, but no long-term impacts are expected.

The proposed action would have no impact on any threatened or endangered wildlife species, except possibly the Preble's mouse. Preble's mice have been captured in the vicinity of several of the ponds, and the possibility exists that project activities may have an effect on the Preble's mouse. While there is potential for direct and indirect "take", these actions have been addressed through consultation with the USFWS. Several of the dams are located within the current Preble's mouse protection areas at the Site. At most of the dams, the top of the dam and the riprap inner face of the dams are not considered Preble's mouse habitat because these areas are primarily roads and riprap, neither of which is considered habitat. The downstream sides of the dams are typically vegetated with smooth brome, an exotic grass species, and so provide lower quality habitat than areas of shrubs and trees often found along the streams at the Site. Project activities necessary to breach the dams are primarily restricted to the dams themselves and the area directly adjacent to the dams. Therefore, minimal impacts to the Preble's mouse habitat above and below the dams would be experienced.

Most of the impacts to the Preble's mouse would be a temporary loss of habitat, although a small amount of permanent habitat loss may be expected where the dam breach is cut and lined with riprap. If the project activities take place during the hibernation season of the Preble's mouse, the potential for impacts is further minimized. If project activities take place during the active season of the mouse, besides potential direct effects, some potential indirect effects are possible from noise and construction activities. However, the use of heavy equipment in Preble's mouse habitat during the active season of the mouse has been consulted on with the USFWS. The use of heavy equipment is governed by the Biological Opinion for the Programmatic Biological Assessment issued by the USFWS in 2004. This Biological Opinion (and the associated Programmatic Biological Assessment) outlines best management practices that include the use of heavy equipment in Preble's mouse habitat. Substantial habitat that the Preble's mice may move to and inhabit during the project activities is present upstream and downstream from the project locations. Revegetation of the project areas once the project activities are completed would reestablish the disturbances with higher quality native plant species.

Evaluated at a larger scale, the breaching of the dams would affect little habitat and have minimal impact on the regional or rangewide distribution of the Preble's mouse. The Preble's mouse occurs in all three major drainages at the Site (Rock Creek, Walnut Creek, and Woman Creek) and this project would only minimally impact the Preble's mouse in Upper Walnut Creek. Preble's mouse critical habitat in Wyoming includes approximately 125 miles of rivers and streams and over 10,000 acres of land, and in Colorado it includes approximately 235 miles of rivers and streams and over 20,000 acres of land (FR 37276-37332). Thus on the larger Site-wide, regional, and range wide scales, the impacts would be insignificant.

The proposed action would result in both short-term impacts and some permanent loss of habitat at the Site. Although these impacts are minimal and are not substantive enough to be considered adverse, the proposed action does result in the highest impact of the alternatives analyzed.

5.1.2 Physical Resources

5.1.2.1 Water Resources

Evaporative Losses

The proposed action, which involves modifying interior ponds A-1 and A-2 on North Walnut Creek, and Ponds B-1, B-2, B-3, and B-4 on South Walnut Creek, would maintain pond elevations at approximately the same levels projected to exist for the baseline configuration, except for Pond A-2. The Pond A-2 average pool elevation would be lowered in the proposed action by approximately six feet, compared to the baseline configuration, to satisfy engineering requirements for a breach through which storm flows can be safely routed. Therefore, since the pool levels in all but one pond are projected to be approximately the same compared to the baseline configuration, the difference in evaporative losses between the proposed action and the baseline configuration is expected to be relatively minor. If the proposed action is implemented, then a detailed evaluation of predicted evaporative losses should be performed. The evaluation should include an assessment of water rights implications and the potential need for an augmentation plan.

Floodplain Impacts/Storage Capacity – North Walnut Creek

The proposed action to modify interior ponds A-1 and A-2 on North Walnut Creek would not impact the storage capacity compared to the baseline, because A-1 and A-2 are off-line in the baseline configuration (and essentially unavailable for storing runoff). In the short-term with the proposed action, the bypass structures are still used and the effective storage capacity of the North Walnut Creek ponds is no different than in the baseline. In the long-term with the proposed action, the bypass structures are not used, and a small amount of additional storage is added with Ponds A-1 and A-2 on-line, but with their capacities reduced (compared to the existing dams) because of the constructed notches.

Ponds A-3 and A-4 remain unaltered in the proposed action. The combined 45 million gallons of storage capacity for these ponds (12.4 million gallons and 32.6 million gallons for Ponds A-3 and A-4, respectively) would adequately store the runoff from a large storm event. For perspective, the runoff volume projected for North Walnut Creek for a 100-year, 6-hour storm event (3.8 inches of precipitation) is 11.4 million gallons. Therefore, as a system, Ponds A-3 and A-4 are projected to have sufficient capacity to collectively store the runoff volume from a 100-year storm if the proposed action is implemented and they are

operated in a manner consistent with the operating protocol currently used (Pond A-3 and A-4 discharges initiated when the each pond is approximately 40 percent full [K-H, 2002b]). In addition, as noted earlier, engineering analyses should be performed to assess the impacts of routing flows through the modified drainage.

Floodplain Impacts/Storage Capacity – South Walnut Creek

Ponds B-1, B-2, and B-3 are off-line in the baseline configuration for South Walnut Creek (Ponds B-1 and B-2 are off-line because the existing bypass structure routes flows around them, and Pond B-3 is off-line because WWTP discharges to B-3 are eliminated in the baseline configuration). Therefore, only the modification of Pond B-4 impacts the storage capacity of the ponds that are on-line, or actively used in the baseline configuration. Since the capacity of Pond B-4 (1 million gallons) is less than 5 percent of the capacity of Pond B-5 (24 million gallons), and since Pond B-5 would remain intact in the proposed action, the actively used storage volume of South Walnut Creek would not be diminished greatly in the proposed action.

In terms of flood detention, the 24 million gallon Pond B-5 capacity compares with a runoff volume of 6.5 million gallons projected for a 100-year, 6-hour storm event (3.8 inches of precipitation) (K-H, 2003a). Therefore, if Pond B-5 is operated to keep the pool level at 50 percent full or less (which is consistent with the operating protocol currently used), sufficient capacity is projected to remain in Pond B-5 to capture the runoff volume from a 100-year storm. Again, engineering analyses should be performed to assess the impacts of routing flood flows through the modified drainage.

Water Quality – North Walnut Creek

Ponds A-1 and A-2 are off-line in the baseline configuration and therefore offer no tangible water quality benefit to North Walnut Creek downstream. In the short-term of the proposed action, water would continue to be routed through the North Walnut Creek bypass structure, so the flow routing implies there should be little change to the baseline configuration water quality. Some short-term impact to water quality could potentially occur as a result of the construction disturbance at Ponds A-1 and A-2. However, storm flows would continue to be routed through the bypasses and around these ponds while they are being modified. This would help to reduce short-term adverse impacts caused by soil disturbance during the pond modifications.

In the long-term, after vegetation has become established in the disturbed areas, the North Walnut Creek drainage would be routed through the modified A-1 and A-2 ponds. This would provide additional settling time, compared to the bypass structure, and passage through wetlands vegetation in those ponds should also be beneficial for water quality. Therefore, some potential long-term water quality benefits may be derived in North Walnut Creek from the proposed action.

The proposed action keeps Ponds A-3 and A-4 in their current configuration. With Pond A-3 acting as an upstream detention basin, Pond A-4 can remain temporarily isolated, when necessary, from additional inflow. This allows Pond A-4 to be isolated from the rest of the North Walnut Creek watershed while water is being held in the pond, or when it is being discharged to flow off the Site.

Water Quality – South Walnut Creek

As noted earlier, Ponds B-1, B-2, and B-3 are off-line from the storm flow routing in the baseline configuration; therefore, these ponds offer no tangible water quality benefit in the baseline. In the short-term of the proposed action, water would continue to be routed through the South Walnut Creek bypass structure, so the flow routing implies there should be little change to the baseline configuration water quality. Some short-term impact to water quality could potentially occur as a result of the construction disturbance at Ponds B-1, B-2, and B-3. However, storm flows would continue to be routed through the bypasses and around these ponds while they are being modified. This would help to reduce short-term impacts caused by soil disturbance during the pond modifications.

In the long-term, water would be routed through the modified B-1, B-2, and B-3 ponds. This would add some settling time, compared to routing flows through the bypass structures, and passage through wetlands vegetation in those ponds should also be beneficial for water quality. Therefore, some potential long-term water quality benefits may be derived in South Walnut Creek from the proposed action.

Pond B-4 would also be notched in the proposed action, though the average pool elevation is expected to remain approximately the same as in the baseline configuration. Therefore, the proposed action at this pond is not expected to impact water quality in the long-term.

Potential short-term impacts to water quality could potentially occur during the dam modification at Pond B-4. Since the South Walnut Creek bypass structure does not route flows around Pond B-4, other flow routing options would have to be implemented during the construction period (such as utilizing the Central Avenue Ditch bypass channel), in conjunction with other stormwater Best Management Practices. It is noted that Pond B-5 would not be altered throughout the proposed action, and would therefore be available for capturing and settling suspended sediments caused by construction disturbances at Pond B-4 or any of the other B series ponds modified in the proposed action. Pond B-5 is projected to not require a discharge during even a wet year climate simulation (K-H, 2002b). It may require several years with above average precipitation, or multiple large storm events, to force Pond B-5 to be discharged.

5.1.2.2 Air Resources

Air quality environmental effects are determined by estimating potential increases in the concentrations of regulated pollutants in ambient air as a result of specified

actions, and comparing the increased concentrations to known environmental standards. The primary air pollutant of concern that would be generated from the proposed action is fugitive dust, which includes total suspended particulate matter (TSP), PM_{10}, and $PM_{2.5}$. There is currently a National Ambient Air Quality Standard for PM_{10}, and substantial PM_{10} baseline concentration data for the area surrounding the Site, so that is the air pollutant that would be used for air quality environmental effects comparisons for the EA. PM_{10} emissions would be generated from the following soil disturbance activities:

- Truck traffic on paved and unpaved roads;
- Soil handling activities (front-end loaders and dump trucks);
- Soil excavation (back-hoes or track-hoes); and
- Soil contouring and compacting with graders and bulldozers.

There would be a temporary minor increase in the concentration of PM_{10} surrounding the Site during soil disturbance activities and transportation activities associated with the proposed action to modify the interior ponds. PM_{10} air emissions would be generated during excavation, soil handling, grading, and truck traffic activities associated with breaching the interior ponds. Air pollutant emission factors for PM_{10} from EPA's Compilation of Air Pollutant Emission Factors, AP-42 Fifth Edition, Volume I, (USEPA, 1995) were utilized to estimate uncontrolled emissions from this proposed action based on conservative estimates of volumes of soil to be disturbed and transported. The estimated emissions were then used as inputs to EPA's SCREEN3 air quality model to determine potential impacts to known baseline PM_{10} concentrations in the ambient air surrounding the Site. SCREEN3 is intended to support screening-level air quality modeling analyses (compliance demonstrations) for the National Ambient Air Quality Standards (CDPHE, 2002). Modeling procedures from CDPHE, Air Pollution Control Division/Technical Services Program were utilized for this assessment.

Total air quality impacts were analyzed by adding the estimated PM_{10} concentrations from the modification of the existing ponds activities to known baseline concentrations of PM_{10} from CDPHE monitoring studies at the perimeter of the Site, and comparing the sum of the concentrations to the EPA National Ambient Air Quality Standard for PM_{10}. The annual average PM_{10} concentration from CDPHE air monitors on the Site perimeter averaged about 15 micrograms per cubic meter. The National Ambient Air Quality Standard for PM_{10} is 50 micrograms per cubic meter. The estimated concentration of PM_{10} in ambient air at the Site boundary attributed to the modification of interior ponds proposed action is 0.3 microgram per cubic meter, which only increases the PM_{10} baseline concentration on the Site perimeter from 15 micrograms per cubic meter, to 15.3 micrograms per cubic meter. This is still well below the EPA's National Ambient Air Quality Standard of 50 micrograms per cubic meter. The proposed action would result in temporary air quality impacts only during active soil disturbance activities. There would be no future permanent sources of air pollutant emissions

as result of this project. The proposed action would not result in a significant impact to ambient air quality.

5.1.2.3 Archaeological/Cultural Significance

RFETS was placed on the National Register of Historic Places as a Historic District (5JF1227) on May 19, 1997. Historic District designation mandates compliance with the Historic Preservation Act of 1966, and the Programmatic Agreement among DOE, The Colorado State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding Historic Properties at RFETS. While the proposed action would be conducted within the Historic District boundaries, no impact would occur to protected structures.

5.1.2.4 Noise

The proposed action would include a temporary increase in local noise levels from the operation of heavy equipment, and the loading and hauling of soil. The Cumulative Impacts Document (DOE, 1997) found that noise levels from industrial activities within the RFETS boundary were not distinguishable from background traffic noise levels. Noise levels from the proposed action are not expected to be perceptible at offsite locations. As soils are not anticipated to be transported offsite, noise to nearby residential areas would not be increased.

5.1.3 Human Health

Impacts to human health and safety under the proposed action are limited to construction safety and the potential for health impacts associated with offsite discharges of water. Since air emissions are expected to produce negligible changes in concentrations at the Site boundary (Section 5.1.2.2), there would be no impacts to the public from construction. Human health impacts would be limited to occupational illness or injury associated with project implementation; workers would be subject to standard industrial hazards associated with construction activities necessary to reconfigure the dams (notching, grading, and armor installation). Activities would be subject to a construction safety program developed in accordance with Site policy and procedures. In view of RFETS construction procedures and Site safety history, health impacts from implementing the proposed action would be no greater – and likely less than – those from similar construction projects. Construction-related impacts would be temporary, as they would be limited to the construction period.

As discussed earlier, baseline flows affected by the proposed action would be significantly less than historical flows through the pond system, and batch releases from terminal Ponds A-4 and B-5 would be occurring less often than is currently the case. Notching of the interior pond dams (except for Pond A-3) would reduce the overall storage capacity of the pond system, however, because of these reduced flows, it is expected that there would be essentially no difference in water discharge volume as a result of the proposed action. As the proposed action would also have essentially no

effect on baseline water quality (Section 5.1.2.1), there would be no significant change in the potential offsite health impacts associated with routine discharges from the drainages.

5.2 Alternative Action – A and B Series Ponds

5.2.1 Biological Resources

The alternative action for modification of the interior ponds would restore the drainage above the terminal ponds to a flow-through system, by removing the dams and ponds altogether. Removal of the dams and ponds and reconstruction of the stream channel would result in an impact area several times larger than that of the proposed action. As a result, most of the open water habitat and wetland habitat would be decreased or eliminated.

5.2.1.1 Vegetation and Wetlands

Direct impacts to vegetation communities could occur from excavation and grading for embankment removal, channel reconfiguration, and disturbance from construction areas. Indirect impacts could occur from weed invasion.

This alternative entails removal of the interior pond embankments (Ponds A-1, A-2, A-3, B-1, B-2, B-3, and B-4) and grading of the pond areas and intervening channel. The area disturbed would encompass the footprints of the interior ponds, intervening channel, and adjacent area used for construction.

This alternative would permanently impact all the wetlands in the immediate vicinity of the ponds (over 5 acres). However, some new wetlands may develop along the newly created drainage channel. Approximately 16 acres of grassland communities and 0.5 acre of shrubland and tallgrass prairie adjacent to the ponds may be temporarily impacted. All impacts to upland vegetation are considered temporary since these areas would be revegetated. Most of the impact to upland communities is to reclaimed mixed grassland, which is a previously disturbed and revegetated area. Permanent wetland impacts resulting from the alternative would be significantly greater than those resulting from the proposed action. Indirect impacts could occur from invasion of disturbed areas by weeds. The alternative action would have no impact on threatened or endangered plant species, or any candidate plant species because of its location.

5.2.1.2 Wildlife

The change of the habitat from a series of ponds with some wetland edge to a more natural, intermittent stream with some riparian shrubland/woodland vegetation would result in a shift to a different set of wildlife species using the area after project completion and vegetation establishment. The use of the area by waterfowl, shorebirds, aquatic species, and some amphibians and reptiles that require more open water habitats would likely be reduced. However, other ponds and lakes both on- and offsite would be available for some of these species to utilize. The waterfowl and shorebird species would be replaced by the neo-

tropical birds typical of the riparian shrubland/woodland areas at the Site. Tree establishment in the long-term could also provide perches and nesting locations for raptors.

A similar shift of aquatic organisms (fish, amphibians, reptiles, and benthic macro-invertebrates) from those typical of pond environments to that of a riparian habitat would also be expected. Most mammalian species that utilize the project area are not restricted to any one type of vegetation community, and these animals would be able to move either upslope, or up or down stream from the project area during project activities. Large mammals such as mule deer and coyotes would simply relocate during project activities, but would return to utilize the areas after project completion. Other large mammal species like elk, bears, and white tailed deer are uncommon in the project areas, and would not be directly or indirectly affected by proposed project activities. Once project activities conclude and the areas are revegetated, these species would return to utilize the changed habitat much like they do in the other drainages at the Site. The change from the pond configuration to a riparian habitat configuration would result in the replacement of some species by other species that are more adapted to the end state conditions. For other wildlife species there would be little change at all.

The alternative action would have no impact on any threatened or endangered wildlife species, except possibly the Preble's mouse. Preble's mice have been captured in the vicinity of several of the ponds and so due to the increased size of the project (compared to the breaching option), would have the potential for a greater impact on the Preble's mouse and its habitat. While there is potential for direct and indirect "take", these actions have been addressed through consultation with the USFWS. Substantial habitat is present upstream and downstream from the project locations where the Preble's mice may move to and relocate during the project activities. Previous projects at the Site have used heavy equipment in Preble's mouse habitat during the active season of the Preble's mouse and have not shown adverse effects. The change from a series of ponds where the open water actually does not serve as habitat, to a riparian streamside habitat, with the associated increase in terrestrial habitat available, could potentially increase the amount of Preble's mouse habitat in the project area. The shift would especially affect the A-3 pond area that currently is not considered Preble's mouse habitat at the Site. The conversion of that area to a riparian habitat with vegetation similar to that upstream of the A series ponds would result in a more continuous reach of Preble's mouse habitat in the A series of ponds, than would exist at baseline conditions. Additionally, the removal of the dams and the roads across their tops and associated riprap areas (above and below the dams), that are not considered Preble's mouse habitat, would result in an overall increase of Preble's mouse habitat in North and South Walnut Creek. Replacement of the largely exotic species of smooth brome, which is the dominant grass around the dams and ponds in both North and South Walnut Creek, would also improve the habitat for wildlife species. The removal of the dams and ponds would also eliminate the maintenance needs and requirements currently needed for the dams. Thus,

returning the drainage to a natural stream would reduce future human impacts to the area, having less impact to the Preble's mouse.

Evaluated at a larger scale, the removal of the dams and ponds would have minimal impact on the regional or rangewide distribution of the Preble's mouse. The Preble's mouse occurs in all three drainages at the Site and this project would only impact a portion of the Preble's mouse habitat in Walnut Creek. Critical habitat for the Preble's mouse includes approximately 125 miles of rivers and streams and over 10,000 acres of lands in Wyoming, and approximately 235 miles of rivers and streams and over 20,000 acres of lands in Colorado (FR 37276-37332). Thus on the larger Site-wide, regional, and range wide scales, the impacts would be insignificant.

The final analysis for the alternative action suggests that although there may be some short-term impacts to the ecological resources, the end result of removing the dams and ponds, and re-establishing the natural stream drainage and flows would be largely beneficial. Long-term benefits to the ecological resources outweigh the short-term impacts of the action.

5.2.2 Physical Resources

5.2.2.1 Water Resources

Evaporative Losses – North Walnut Creek

The alternative pond configuration involves removing all the interior ponds in the North Walnut Creek drainage. Since Ponds A-1, A-2, and A-3 would be eliminated, evaporative losses from the North Walnut Creek drainage would be diminished, compared to the baseline configuration.

The annual evaporative loss from the North Walnut Creek interior ponds in their baseline configuration, based on the WY2000 climate, is estimated to be approximately 3.3 million gallons (10.1 acre-feet) (K-H, 2002b). This represents more than 20 percent of the projected total inflow volume to North Walnut Creek, for the baseline configuration (projected to be approximately 14.7 million gallons, based on the WY2000 climate [K-H, 2002b]). Therefore, compared to the baseline configuration, the alternative pond configuration would cause a reduction in evaporative losses and a significant increase in water volume (as a fraction of the total) that flows to Pond A-4.

Evaporative Losses – South Walnut Creek

The alternative pond configuration involves removing South Walnut Creek interior Ponds B-1, B-2, B-3, and B-4. Similar to North Walnut Creek, removing the interior ponds in South Walnut Creek would cause evaporative losses to be diminished, compared to the baseline configuration. The annual evaporative loss from the South Walnut Creek interior ponds, based on the WY2000 climate, is estimated to be approximately 1.2 million gallons (K-H, 2002b). This represents

roughly 45 percent of the projected total inflow volume to South Walnut Creek, for the baseline configuration (approximately 2.6 million gallons, based on WY2000 climate [K-H, 2002b]).

Therefore, compared to the baseline configuration, the alternative pond configuration would cause a reduction in evaporative losses and a significant increase in the volume flowing to Pond B-5. When assessing the impact of the alternative on both North and South Walnut Creeks, removing the interior ponds would have a larger impact on South Walnut Creek, in terms of the fractional increase in the amount of water delivered to the terminal pond.

Floodplain Impacts/Storage Capacity – North Walnut Creek

The alternative to remove all the interior ponds would result in reduced flood storage capacity, compared to the baseline configuration, because Pond A-3 (12.4 million gallon capacity) is eliminated. Removing Ponds A-1 and A-2 as part of the alternative does not impact the actively used storage capacity compared to the baseline, because A-1 and A-2 are off-line in the baseline configuration.

Pond A-4 (approximately 32.6 million gallons of capacity) would remain unaltered in the alternative configuration. The Pond A-4 capacity compares with a runoff volume of approximately 11.4 million gallons projected for a 100-year, 6-hour storm event (3.8 inches of precipitation). Therefore, if Pond A-4 is operated to keep the pool level at 50 percent full or less (which is consistent with the operating protocol currently used), sufficient capacity would exist in Pond A-4 to capture the runoff volume from a 100-year storm.

Floodplain Impacts/Storage Capacity – South Walnut Creek

The routinely available storage capacity in South Walnut Creek would be reduced if the interior ponds are all removed, but only minimally, because Ponds B-1 and B-2 are off-line in the baseline configuration, as well as Pond B-3 (which does not receive WWTP effluent in the baseline). Therefore, removing Pond B-4 is the only action in the alternative that impacts the active storage capacity of the on-line ponds, compared to the baseline configuration. Since the combined capacity of Pond B-4 (1 million gallons) is less than 5 percent of the capacity of Pond B-5 (24 million gallons), which would remain unaltered, the actively used storage volume would not be diminished significantly as a result of Pond B-4 being removed.

In terms of flood detention, the 24 million gallon Pond B-5 capacity compares with a runoff volume of 6.5 million gallons projected for a 100-year, 6-hour storm event (3.8 inches of precipitation). Therefore, if Pond B-5 is operated to keep the pool level at 50 percent full or less (which is consistent with the operating protocol currently used), more than sufficient capacity would remain in Pond B-5 to capture the runoff volume from a 100-year storm.

Water Quality – North Walnut Creek

Ponds A-1 and A-2 are off-line in the baseline configuration and therefore offer no tangible water quality benefit to North Walnut Creek downstream. With the alternative action, water would continue to be routed through the North Walnut Creek bypass structure, so the flow routing implies there should be little change to the baseline configuration water quality. However, some adverse impact to water quality could potentially occur as a result of the construction disturbance at Ponds A-1 and A-2. Storm flows would continue to be routed through the bypass structure and around these ponds while they are being removed. This would help to reduce short-term adverse impacts caused by soil disturbance during the dam removal work.

Removal of Pond A-3 in this alternative would cause the holding time to be reduced in the North Walnut Creek retention ponds, compared to the baseline configuration. However, Pond A-4 would remain intact in this alternative and is projected to be discharged only once per year, based on the WY2000 climate. This should provide more than sufficient residence time for particle settling, based on historic operations and water quality observed at the outfall of Pond A-4.

An important operational change caused by the removal of Pond A-3 is the impact of not being able to isolate Pond A-4 from the rest of the North Walnut Creek drainage while a discharge is being released to flow offsite. In low flow conditions, this may not be a factor. However, during a storm event, discharging Pond A-4 with flow from the rest of the watershed entering the pond makes this alternative less desirable, compared to the baseline configuration, in terms of Pond A-4 operations and the potential impact on water quality. The design of the current pond configuration provided the luxury of isolating the terminal pond to the A-series ponds but not the B-series ponds.

Water Quality – South Walnut Creek

As noted earlier, Ponds B-1, B-2, and B-3 are off-line from the storm flow routing in the baseline configuration; therefore, these ponds offer no tangible water quality benefit in the baseline. In the alternative action, water would continue to be routed through the South Walnut Creek bypass structure, so the flow routing implies there should be little change to the baseline configuration water quality. However, some impact to water quality could potentially occur as a result of the construction disturbance while Ponds B-1, B-2, and B-3 are removed. Storm flows would continue to be routed through the bypasses and around these ponds during the dam removal work, which should help to reduce short-term impacts caused by soil disturbance.

In the long-term, with the interior ponds removed in this alternative, runoff from the watershed immediately surrounding Ponds B-1, B-2, and B-3 would flow to Pond B-5. This runoff is not expected to adversely impact water quality in the lower reaches of North Walnut Creek.

Pond B-4 would also be removed in this alternative. However, the capacity of B-4 (1 million gallons) is small relative to Pond B-5 (24 million gallons), which would remain in its current configuration. The relatively minor reduction in holding time, caused by the elimination of Pond B-4, should not adversely impact water quality in the South Walnut Creek drainage, since Pond B-5 would remain to capture and settle suspended solids. Potential short-term adverse water quality impacts may occur during the dam removal at Pond B-4, because the South Walnut Creek bypass structure does not route flows around Pond B-4. Therefore, other flow routing options would have to be implemented during the removal of the B-4 dam (such as utilizing the Central Avenue Ditch bypass channel), in conjunction with other stormwater Best Management Practices.

Pond B-5 is projected to not require being discharged during even a wet year climate simulation (K-H, 2002b). It may require multiple years with above average precipitation, or several large storm events, to force Pond B-5 to be discharged. In any event, removing Pond B-4, or any other interior pond in South Walnut Creek, is not expected to cause long-term adverse impacts to water quality in that drainage.

5.2.2.2 Air Resources

Air quality environmental effects for the alternative action are estimated similarly to that described for the proposed action. There would be a small, temporary increase in the concentration of PM_{10} surrounding the Site during soil disturbance activities and transportation activities associated with the removal of the interior ponds alternative action. PM_{10} air emissions would be generated from excavation, soil handling, grading, and truck traffic associated with removing the interior ponds.

Total air quality impacts were analyzed by adding the estimated PM_{10} concentrations from the removal of the interior ponds activities to known baseline concentrations of PM_{10} from CDPHE monitoring studies at the perimeter of the Site, and comparing the sum of the concentrations to the EPA National Ambient Air Quality Standard for PM_{10}. The annual average PM_{10} concentration from CDPHE air monitors on the Site perimeter averaged about 15 micrograms per cubic meter. The National Ambient Air Quality Standard for PM_{10} is 50 micrograms per cubic meter. The estimated concentration of PM_{10} in ambient air at the Site boundary attributed to the removal of the interior ponds alternative action is 0.6 micrograms per cubic meter, which only increases the PM_{10} baseline concentration on the Site perimeter from 15 micrograms per cubic meter, to 15.6 micrograms per cubic meter. This is still well below the EPA's National Ambient Air Quality Standard of 50 micrograms per cubic meter. The removal of interior ponds alternative action would result in temporary air quality impacts only during active soil disturbance activities. There would be no future permanent sources of air pollutant emissions as result of this project. The alternative action would not result in a significant impact to ambient air quality.

5.2.2.3 Archaeological/Cultural Significance

RFETS was placed on the National Register of Historic Places as a Historic District (5JF1227) on May 19, 1997. Historic District designation mandates compliance with the Historic Preservation Act of 1966, and the Programmatic Agreement among DOE, The Colorado State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding Historic Properties at RFETS. While the alternative action would be conducted within the Historic District boundaries, no impact would occur to protected structures.

5.2.2.4 Noise

The alternative action would include a temporary increase in local noise levels from the operation of heavy equipment, and the loading and hauling of soil. The CID (DOE, 1997) found that noise levels from industrial activities within the RFETS boundary were not distinguishable from background traffic noise levels. Noise levels from the alternative action are not expected to be perceptible at offsite locations. As soils are not anticipated to be transported offsite, noise to nearby residential areas would not be increased.

5.2.3 Human Health

Human health impacts resulting from this alternative would be similar in nature to those described for the proposed action in Section 5.1.3, but, as discussed below, would be generally higher. Impacts from construction activities would be higher than those for the proposed action. More material must be moved to completely remove the dams, leading to higher levels of fugitive dust and equipment emissions. The potential for occupational injury from construction activity would also be proportionally higher because of longer construction times for this alternative. As discussed in Section 5.1.3, because of reduced flows in the affected drainages, there would be no significant changes in human health impacts resulting from implementing this alternative.

5.3 No Action Alternative – A and B Series Ponds

5.3.1 Biological Resources

The No Action Alternative would not alter the environmental conditions present in the project areas and therefore would have no effect on the biological resources described in Chapter 4 of the EA. Indirect effects from the water depletion issues described earlier would still occur.

5.3.2 Physical Resources

5.3.2.1 Water Resources

The No Action Alternative would not change the baseline configuration of the ponds or their operating protocol. Therefore, the No Action Alternative would

not impact the quantity or quality of water flowing through the pond system relative to the baseline configuration.

5.3.2.2 Air Resources

Under the No Action Alternative, construction activities would not take place, and therefore, impacts to air quality would not be different than those currently observed.

5.3.2.3 Archaeological/Cultural Significance

Under the No Action Alternative, construction activities would not take place, and therefore, impacts would not occur to protected structures.

5.3.2.4 Noise

Under the No Action Alternative, construction activities would not take place, and therefore, noise levels would not increase from those currently observed.

5.3.3 Human Health

Under the No Action Alternative, the pond systems would be left in their existing physical configuration and the ponds would be managed in accordance with current practice. There would be no human health impacts from construction activities, and the water retention capability of the pond systems would remain at baseline levels, resulting in no change to the potential for offsite contamination discharges.

5.4 Cumulative Effects

Cumulative impacts are those changes to the physical and biological environments that would result from the Proposed Actions or alternatives considered, in combination with other ongoing actions and reasonably foreseeable future actions. Impacts associated with actions analyzed in the EA would be limited to the immediate Site area, would not be significant, and would be temporary in nature. Therefore, there would be no significant cumulative impacts from the Proposed Actions or the alternatives. The short-term increases in air emissions and noise during construction activities, and the minor impacts predicted for other resource areas (e.g., water resources), would be minimal when considered cumulatively with other ongoing activities at and in the vicinity of RFETS.

There may be a cumulative beneficial impact to the ecological environment from the proposed actions and alternatives. Completing the actions may enhance the habitat for some species and render the affected area more consistent with the overall transfer of the Site to USFWS for use as a National Wildlife Refuge.

5.5 Environmental Justice

Executive Order 12898 directs that each federal agency identify and address, as appropriate, “disproportionately high and adverse human health or environmental effects

of its programs, policies, and activities on minority populations and low-income populations." Included in consideration of environmental justice issues under NEPA are the significance of impacts and whether these impacts would disproportionately fall on minority or low-income populations.

Impacts of the Proposed Actions and Alternatives would not be significant, because they are largely limited to the Site, and because there are no significant minority or low-income populations in the Site area. There would be no disproportionately high and adverse human health or environmental effects, as related to the consideration of environmental justice.

5.6 Compliance with Other Regulations

Regardless of the action chosen, activities would be performed in full compliance with all governing environmental regulations. In both the proposed action and the alternative, generated wastes would be properly characterized and reused or disposed of accordingly. Dams would be modified to maintain their integrity and reliability. Air permits or emissions notices would be acquired as dictated by construction activities. USACE permits would be obtained for activities affecting jurisdictional wetlands. Finally, DOE has consulted with USFWS for actions that may affect Preble's mouse habitat.

In 1994, a Federal grant was issued to the cities of Westminster, Thornton, and Northglenn to construct the Standley Lake Protection Project. This grant included funds for construction of wetlands to mitigate the impacts from construction of the project. Surplus project funds were used for additional wetland construction to be applied toward mitigating wetland impacts from DOE activities on the Rocky Flats Site.

The DOE Wetlands Mitigation Site has been functioning as a viable wetland for over seven years. Approval will be requested from the EPA and the USACE to credit those acres into a Rocky Flats Wetland Mitigation Bank. When these acres are credited to the wetland bank, consideration may be given to applying these credits to wetland impacts occurring from non-CERCLA activities analyzed in this EA.

5.7 Conclusions

The actions analyzed in this section would not result in significant environmental impacts. However, the extent of environmental impact varies based on the action chosen. Table 5-3 provides a summary comparison of the actions analyzed and their environmental impacts. Impacts from reductions in water quantity (due to removal of the wastewater treatment plant and removal of impermeable surfaces in the IA) would have environmental impacts. These impacts are not within the scope of this EA.

Table 5-1. Summary Comparison of Environmental Impacts – A and B Series Ponds

Action	Vegetation/ Wetlands	Wildlife	Water	Air	Archeological/ Cultural	Noise	Human Health
Proposed Action (Pond Reconfig.)	Temporary and permanent impacts to vegetation and wetlands around the dams. Some permanent loss of habitat. Little long-term benefit or loss. Greater diversity of wetland community.	Temporary and permanent losses of PMJM habitat. Short-term impacts during project activities. Little impact or benefit to wildlife overall.	Evaporative losses similar to baseline. Potential short-term impact to water quality caused by construction of notches. Long-term water quality benefit with flow-through ponds.	Minor, temporary impacts from construction activities.	No impacts.	Minor, temporary impacts from construction activities.	Minimal, temporary impacts expected. Limited to occupational safety and exposure. Offsite impacts would be minimized through process controls.
Alternative Action (Pond Removal)	Larger permanent loss of wetlands than in proposed action. Greater potential for indirect impacts through weed invasion due to larger disturbance.	Larger temporary impacts to PMJM and other wildlife habitat. However, in the long-term there is an increase in terrestrial habitat for PMJM and other wildlife. Trade-off is a loss of some habitat for aquatic species.	Evaporative losses less than baseline. Larger potential for short-term impact to water quality caused by removal of dams and drainage reconfiguration. Slight impact to long-term water quality since Pond A-4 unable to be isolated when discharged.	Minor, temporary impacts from construction activities. Slightly more impact than Proposed Action.	No impacts.	Minor, temporary impacts from construction activities. Slightly more impact than Proposed Action.	Minimal temporary impacts expected. Similar to impacts from Proposed Action, but generally higher due to increased activity.
No Action Alternative	No impacts.	No impacts. Maintains need to consult with USFWS for dam/pond maintenance.	No impacts.	No impacts.	No impacts.	No impacts.	No impacts.

6.0 ENVIRONMENTAL EFFECTS FOR OTHER NON-CERCLA CLOSURE ACTIVITIES

The section discusses how the proposed action for the non-CERCLA closure activities and the No Action Alternative would affect the environment described in Section 4 in terms of biological resources, physical resources, and human health. The section also covers potential cumulative effects, environmental justice issues, and compliance with other regulations. Section 6.6 offers conclusions and a summary table based on the evaluation of these effects.

6.1 Proposed Actions – Other Non-CERCLA Closure Activities

6.1.1 Biological Resources

The removal of the North Perimeter road, East Access road, and parking lots would benefit the long-term ecological health of the Site. The short-term impacts from noise and dust during removal activities would have minimal impacts on the wildlife at the Site. The removal and revegetation of the East Access road would reduce habitat fragmentation and remove the barrier to movement for some species of wildlife that has existed for decades in the eastern Buffer Zone. The removal of constant vehicle traffic and associated noise, combined with the revegetation of the road area with native plant species, would establish a larger contiguous landscape more desirable for a National Wildlife Refuge. It would benefit the wildlife species that inhabit the eastern grassland portions of the Buffer Zone.

The impacts to the Preble's mouse at locations where the North Perimeter road crosses North and South Walnut Creeks are being addressed in a Programmatic Biological Assessment for RFETS. The reestablishment and reconnection of the stream reaches that have been fragmented in North and South Walnut Creek would be a benefit to the long-term sustainability of the Preble's mouse at the Site. Preble's mice would be able to move to the headwaters of the streams in the IA and to the western part of North Walnut Creek, where the high bermed North Perimeter road previously acted as a barrier to Preble's mouse movement. No threatened or endangered plants occur at the Site.

Little to no impact is expected on wildlife, plants, endangered or threatened species, candidate species, or aquatic species as a result of using the specified area south and west of Building 371/374 to create a new drainage, because the areas above the original grade are largely disturbed and contain little native habitat. No impacts are expected to the Preble's mouse because the area is located outside the current Preble's mouse protection areas at the Site. The small piece of the area west of Building 371/374 that is within the current Preble's mouse protection area consists of an asphalt road and gravel road shoulder, neither of which constitute Preble's mouse habitat. No other threatened, endangered, or candidate species (plant or animal) are onsite.

Preliminary hydrologic studies for the area south and west of Building 371/374 indicate that after soils have been excavated, the bottom of the area may support wetland plants and have wetter conditions than are currently present in the area. Thus the change from a

disturbed, parking and storage area is expected to be beneficial to the environment and potentially provide additional habitat for wildlife. The hydrologic connection of the area to North Walnut Creek also has the potential to increase the amount of habitat for Preble's mice at the Site. The potential creation of additional wetlands at the Site would be a positive benefit to the otherwise arid conditions typical of the upland plant communities of the Site. Results of this action would provide a benefit to the future National Wildlife Refuge.

The impacts of the Central Avenue Ditch and PIDAS culvert removal activities on the biological resources in these areas would be minimal. Only temporary impacts are expected. Most of the area is highly disturbed and provides little ecological value. The removal of the culverts would re-establish the natural aboveground stream channel that would connect the upstream and downstream portions of the stream that have been fragmented for several decades. This would potentially create a continuous area of wetland in the upper reaches of South Walnut Creek. By removing the culverts, it also opens up a continuous movement corridor for the Preble's mouse into the IA, where previously the high berms and culverts have prevented movement. The culvert removals would effectively increase the amount of Preble's mouse habitat at the Site. Reseeding of the disturbance areas with native plant species would return the area to a more native landscape that provides habitat for other wildlife species. Some additional culverts located in the Buffer Zone are also slated for repair, replacement, or removal, and the impacts on biological resources in these areas would be minimal and constrained to the immediate area.

The configuration of the IA would return the highly disturbed and anthropogenic conditions to more native natural conditions, similar to that found elsewhere in the Buffer Zone at the Site. The reestablishment of native grassland communities in the IA would provide appropriate habitat for native ground nesting birds such as meadowlarks, vesper sparrows, and grasshopper sparrows. Additionally various small mammals, such as deer mice and prairie voles, and larger mammals, such as deer and elk, may use the IA locations after they have been returned to native grassland conditions. As the roads and culverts are removed, the drainages within the IA would be reconnected with North and South Walnut Creeks, and habitat for the Preble's mouse would be created. Barriers to Preble's mouse movement and habitat fragmentation in the Walnut Creek drainage would be removed and travel corridors re-established, thus improving the sustainability of Preble's mouse populations at the Site. No threatened and endangered plants occur onsite, and there would be no impacts on any of these species.

6.1.2 Physical Resources

6.1.2.1 Water Resources

Performing the asphalt removal component of the other non-CERLCA closure activities would create an IA configuration that is comparable to the baseline configuration used for the A and B Series ponds (with buildings and pavement removed). Therefore, as discussed in Section 4 for the affected environment, the IA with the asphalt removed (assuming the buildings have also been removed and

the WWTP discharges discontinued), would have significantly reduced flow volumes. North Walnut Creek is projected to have nearly a 70 percent reduction in total annual flow volume, while South Walnut Creek is projected to have more than a 95 percent reduction (based on the WY2000 climate) (K-H, 2002b). In terms of water quality, short-term impacts could be expected with large areas of exposed soil. In the long-term, however, removing the asphalt would be expected to benefit water quality (assuming Stormwater Best Management Practices [BMPs], such as erosion controls and revegetation, are implemented). In the long-term, removing the asphalt would result in less runoff, with less resulting force to drive future soil erosion processes.

The proposed drainage area, south and west of Building 371/374, is also expected to have some short-term impact on water quality in North Walnut Creek. Again, assuming stormwater BMPs are implemented and vegetation is re-established in the area, long-term impacts to water quality are not expected.

The IA configuration component of the non-CERCLA actions also involves disturbing large areas of soil. Stormwater BMPs must be implemented wherever soil disturbance is occurring, particularly in the channels and on hillslopes, to reduce the risk of soil erosion and the associated transport of contaminants. In the long-term, if BMPs are implemented appropriately, water quality should not be adversely impacted.

6.1.2.2 Air Resources

Air quality environmental effects for the proposed action are estimated in the same manner as those for the modification of the A and B series ponds (described earlier). The primary air pollutant of concern that would be generated from the proposed action is fugitive dust, which includes TSP, PM_{10}, and $PM_{2.5}$. There is currently a National Ambient Air Quality Standard for PM_{10}, and substantial PM_{10} baseline concentration data for the area surrounding the Site, so that is the air pollutant that would be used for air quality environmental effects comparisons for the EA. PM_{10} emissions would be generated from the following soil disturbance activities and are evaluated as a sum of the effects from these activities:

- Truck traffic on paved and unpaved roads;
- Soil handling activities (front-end loaders and dump trucks);
- Soil excavation (back-hoes or track-hoes); and
- Soil contouring and compacting with graders and bulldozers.

There would be a temporary minor increase in the concentration of PM_{10} surrounding the Site during soil disturbance activities and transportation activities associated with the proposed actions. PM_{10} air emissions would be generated during excavation, soil handling, grading, and truck traffic activities. Total air quality impacts were analyzed by adding the estimated PM_{10} concentrations from the described activities to known baseline concentrations of PM_{10} from CDPHE

monitoring studies at the perimeter of the Site, and comparing the sum of the concentrations to the EPA National Ambient Air Quality Standard for PM_{10}. The annual average PM_{10} concentration from CDPHE air monitors on the Site perimeter averaged about 15 micrograms per cubic meter. The National Ambient Air Quality Standard for PM_{10} is 50 micrograms per cubic meter. The estimated concentration of PM_{10} in ambient air attributed to the proposed actions is 0.3 micrograms per cubic meter, which only increases the PM_{10} baseline concentration on the Site perimeter from 15 micrograms per cubic meter, to 15.3 micrograms per cubic meter. This is still well below the EPA's National Ambient Air Quality Standard of 50 micrograms per cubic meter. The proposed action would result in temporary air quality impacts only during active soil disturbance activities. There would be no future permanent sources of air pollutant emissions as result of this project. The proposed actions would not result in a significant impact to ambient air quality.

6.1.2.3 Archaeological Significance

RFETS was placed on the National Register of Historic Places as a Historic District (5JF1227) on May 19, 1997. Historic District designation mandates compliance with the Historic Preservation Act of 1966, and the Programmatic Agreement among DOE, The Colorado State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding Historic Properties at RFETS. While the proposed action would be conducted within the Historic District boundaries, no impact would occur to protected structures.

6.1.2.4 Noise

The proposed action would include a temporary increase in local noise levels from the operation of heavy equipment, and the loading and hauling of soil. The CID (DOE, 1997) found that noise levels from industrial activities within the RFETS boundary were not distinguishable from background traffic noise levels. Noise levels from the proposed action are not expected to be perceptible at offsite locations. As soils are not anticipated to be transported offsite, noise to nearby residential areas would not be increased.

6.1.3 Human Health

Human health impacts of the non-CERCLA activities described in Chapter 3 would be limited to occupational safety and fugitive dust issues associated with asphalt removal and grading operations. These impacts would be similar to those described for dam reconfiguration in Section 5.1.3, though, as described in Chapter 3, locations for these activities would be spread around the Site, primarily in the IA.

As discussed in Section 6.1.2.2, air quality impacts at the Site boundary from fugitive dust and exhaust emissions would be minimal due to distance of most activities from the boundary. Where access road removal would occur near the Site boundary (e.g., at the

East and West entrances), dust control techniques would be applied to keep offsite impacts at a minimum.

As described in Section 5.1.3, workers would be subject to standard industrial hazards (e.g., heavy equipment, machinery, noise, fugitive dust) associated with construction activities necessary to complete the earthworks associated with non-CERCLA activities. Associated impacts would be temporary, as they would be limited to the construction period. These activities would be subject to a construction safety program developed in accordance with Site policy and procedures, and health impacts from implementing the proposed action are expected to be small.

6.2 No Action Alternative – Other Non-CERCLA Activities

6.2.1 Biological Resources

The No Action Alternative would not alter the environmental conditions present in the project areas, and therefore, would have no effect on the biological resources described in Chapter 4 of the EA. This includes the wildlife, plants, endangered or threatened species, candidate species, and aquatic species. However, the desire to achieve a more natural end state would not be achieved.

6.2.2 Physical Resources

6.2.2.1 Water Resources

If the proposed action to remove asphalt in the IA is not performed, the hydrology of the Site would remain somewhat similar to that currently observed, in terms of runoff volumes and peak discharge rates in different watersheds. The runoff would be reduced somewhat from the current configuration because of buildings being removed in any scenario. In any event, the No Action Alternative for the other non-CERCLA actions does have an impact on water resources. There would be no significant reduction in runoff from the IA, and more long-term erosion would occur as a result.

Besides the asphalt removal component, the other non-CERCLA actions, such as the drainage area and the IA configuration, are not expected to have an impact on water resources, relative to the baseline configuration, if the No Action Alternative is implemented.

6.2.2.2 Air Resources

Under the No Action Alternative, construction activities would not take place, and therefore, impacts to air quality would not be different than those currently observed.

6.2.2.3 Archaeological Significance

Under the No Action Alternative, construction activities would not take place, and therefore, impacts would not occur to protected structures.

6.2.2.4 Noise

Under the No Action Alternative, construction activities would not take place, and therefore, noise levels would not increase from those currently observed.

6.2.3 Human Health

Under the No Action Alternative, Site areas addressed in the proposed actions would not be affected, none of the activities described in Chapter 3 would take place, and none of the construction-related human health impacts would occur.

6.3 Cumulative Effects

Cumulative impacts are those changes to the physical and biological environments that would result from the Proposed Actions or alternatives considered, in combination with other ongoing actions and reasonably foreseeable future actions.

Impacts associated with actions analyzed in the EA would be limited to the immediate Site area, would not be significant, and would be temporary in nature. Based on this, there would be no significant cumulative impacts from the Proposed Actions or the alternatives. The short-term increases in air emissions and noise during construction activities, and the minor impacts predicted for other resource areas (e.g., water resources), would be minimal when considered cumulatively with other ongoing activities at and in the vicinity of RFETS.

There may be a cumulative beneficial impact to the ecological environment from the proposed action and alternatives. Completing the actions may enhance the habitat for some species and render the affected area more consistent with the overall transfer of the Site to USFWS for use as a National Wildlife Refuge.

When both the proposed actions for the A and B series ponds and the other non-CERCLA activities are considered together, impacts would be similar to those described for the individual actions. That is, there would be no significant cumulative impacts from the joint proposed actions or the alternatives.

6.4 Environmental Justice

Executive Order 12898 directs that each federal agency identify and address, as appropriate, "disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." Included in consideration of environmental justice issues under NEPA are the significance of impacts and whether these impacts would disproportionately fall on minority or low-income populations.

Impacts of the Proposed Actions and Alternatives would not be significant, because they are largely limited to the Site, and because there are no significant minority or low-income populations in the Site area. There would be no disproportionately high and adverse human health or environmental effects, as related to the consideration of environmental justice.

6.5 Compliance with Other Regulations

Regardless of the action chosen, activities would be performed in full compliance with environmental regulations. In the proposed action, generated wastes would be properly characterized and reused or disposed of accordingly. Air permits or emissions notices would be acquired as dictated by construction activities. USACE permits would be obtained for activities affecting jurisdictional wetlands. Finally, DOE has consulted with the USFWS for actions that may affect Preble's mouse habitat.

6.6 Conclusions

The actions analyzed in this section would not result in significant environmental impacts. However, the extent of environmental impact varies based on the action chosen. Table 6-1 provides a summary comparison of the actions analyzed and their environmental impacts.

Table 6-1. Summary Comparison of Environmental Impacts – Other Non-CERCLA Actions

Action	Vegetation/ Wetlands	Wildlife	Water	Air	Archeological/ Cultural	Noise	Human Health
Proposed Action (Other Non-CLERCLA Activities)	Some temporary disturbance of existing vegetation/ wetlands. Potential to increase native vegetation/ wetlands at the Site by removing anthropogenic landscape features.	Temporary impacts to wildlife species and habitat. Replaces anthropogenic landscape and restores more natural landscape that provides natural functions and processes. Long-term benefits include increased habitat available to wildlife.	Reduces runoff from IA, by removing pavement. Short-term impact on water quality, caused by soil disturbance. Long-term benefit to water quality, with reduced peak runoff and reduced erosion.	Minor, temporary impacts from construction activities.	No impacts.	Minor, temporary impacts from construction activities.	Minimal, temporary impacts expected. Limited to occupational safety and exposure. Offsite impacts would be minimized through process controls.
No Action Alternative	No impacts. Maintains anthropogenic landscape with low native vegetation quality.	No impacts. Maintains anthropogenic landscape that provides little benefit to wildlife.	No action, with respect to asphalt removal, would cause impact by maintaining high runoff from IA, with associated long-term increased erosion in drainages. No impacts from other elements action.	No impacts.	No impacts.	No impacts.	No impacts.

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8.0 ACRONYMS AND GLOSSARY

8.1 Acronyms

ac-ft	Acre Feet
Am	Americium
AMSL	Above Mean Sea Level
BMP	Best Management Practice
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	Cubic Feet Per Second
CO	Carbon Monoxide
DOE	Department of Energy
EA	Environmental Assessment
EDE	Effective Dose Equivalent
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FONSI	Finding of No Significant Impact
ft	Feet
IA	Industrial Area
K-H	Kaiser-Hill Company, L.L.C.
L	Liter
µg	Microgram
Mgal	Millions of Gallons
mrem	Millirem
NEPA	National Environmental Policy Act
NO_2	Nitrogen Dioxide
O_3	Ozone
Pb	Lead
pCi	Picocurie
PIDAS	Perimeter Intrusion Detection Assessment System
PM_{10}	Particulate Matter Less Than 10 Microns
$PM_{2.5}$	Particulate Matter Less Than 2.5 Microns
POC	Point of Compliance
POE	Point of Evaluation
Pu	Plutonium
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
SO_2	Sulfur Dioxide
SWWB	Site-Wide Water Balance
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WWTP	Wastewater Treatment Plant
WY	Water Year

8.2 Glossary

4H:1V – Slope description with 4 units in the horizontal direction and 1 unit in the vertical direction.

Anthropogenic – Relating to people or human activity.

Baseline Configuration – Projected condition in the future after other closure activities have ceased and the environment has stabilized.

Batch Release Operating Protocol – An operating methodology in which the inflowing water to a pond is held in the pond until the pool level reaches a pre-designated level, at which time the batch of water is released out of the pond. In terminal Ponds A-4 and B-5, before the batch is released, a sample of the water is collected and, if sample results indicate water quality standards and goals are met, the batch of water is released through the dam outlet works to flow off the Site.

Buffer Zone – Area of RFETS not covered by industrial buildings or used for industrial activities.

Candidate Species – Plant and animal taxa considered for possible addition to the List of Endangered and Threatened Species under the Endangered Species Act.

Closure – Point in time where the RFETS Buffer Zone is transferred to the USFWS and activities conducted in the IA under the Rocky Flats Closure Contract are deemed complete.

Ecotone – The boundary or transitional zone between adjacent communities.

End State – Physical configuration of RFETS at Closure.

Environmental Justice – An evaluation of whether environmental impacts would disproportionately fall on minority or low-income populations.

Erosion Armoring – Implementing protection, such as small rock boulders (or "rip-rap") for protecting soil from erosion.

Industrial Area – Centrally located area of RFETS developed with buildings and used for industrial activities.

Interior Pond – The ponds that are upstream from the "terminal" or most downstream ponds in each respective drainage. The interior ponds on North Walnut Creek are A-1, A-2, and A-3. The interior ponds on South Walnut Creek are B-1, B-2, B-3, and B-4.

Invert – The bottom level or elevation of a water conveyance structure, such as a pipe or ditch.

Jurisdictional Dam – As defined by the Office of the State Engineer, a dam that impounds water above the natural surface of the ground, thereby creating a reservoir with: 1) a capacity of more than 100 acre-feet, or 2) a surface area in excess of 20 acres at the high-water line, or 3) exceeds 10 feet in height measured vertically from the elevation of the lowest point of the natural surface of the ground where that point occurs along the longitudinal centerline of the dam up to the flowline crest of the emergency spillway of the dam.

Listed Species – Any species of fish, wildlife, or plant which has been determined to be endangered or threatened under Section 4 of the Endangered Species Act.

Mesic – Pertaining to conditions of moderate moisture or water supply.

Non-Jurisdictional Dam – As defined by the Office of the State Engineer, a dam that is less than the size and capacity of a jurisdictional dam.

Notch – A cut excavated and removed from a dam to either eliminate or reduce the pool level stored behind the dam.

Off-Channel – A pond or structure that is not in the path of the normally routed flow. On North Walnut Creek, Ponds A-1 and A-2 do not receive the routine stormwater flowing down the channel, and hence are considered to be off-channel. In South Walnut Creek, Ponds B-1 and B-2 are off-channel.

Point of Compliance – Defined in RFCA as locations where specific water quality standards apply. Point-of-Compliance stations in the Walnut Creek drainage are GS11 (at the outfall of Pond A-4, on North Walnut Creek), GS08 (at the outfall of Pond B-5, on South Walnut Creek), and GS03 (at Walnut Creek and Indiana Street).

Point of Evaluation – Defined in RFCA as locations where specific water quality standards apply, and are located upstream from the Point-of-Compliance locations. Point-of- Evaluation stations in the Walnut Creek drainage are SW093 (upstream from Pond A-1, on North Walnut Creek) and GS10 (upstream from Pond B-1, on South Walnut Creek).

Stop-Log – A wooden plank, or similar structure (sometimes larger), that is used to adjust the height of the pool level that is retained by a dam or similar structure.

Stormwater Bypass – The concrete diversion structures and pipelines used to divert stormwater around Ponds A-1 and A-2 (on North Walnut Creek) and Ponds B-1, B-2, and B-3 (on South Walnut Creek).

Taxa – Groups of organisms or populations considered to be sufficiently distinct from other such groups as to be treated as a separate unit.

Terminal Pond – The most downstream pond in each respective drainage. The terminal pond on North Walnut Creek is A-4, and on south Walnut Creek is B-5.

Water Balance – An assessment of the water inputs, usage, and outputs at a specific location. RFETS inputs involve elements such as imported water (piped in from an outside source) or precipitation falling on the Site. Outputs involve elements such as evaporation, evapotranspiration (from plants), and stormwater running off the Site. The SWWB is a computer model study of the RFETS water balance that was completed in 2002.

Water Importation – Water routed to RFETS from an outside source, such as water leased from the Denver Water Board and routed to RFETS via pipeline.

Water Year – The period of time from October 1 of the previous year through September 30 of the referenced year. For example, Water Year 2000 is from October 1, 1999 through September 30, 2000.

Xeric – Having very little moisture or water supply.